PUBLIC VERSION

223704

**BEFORE THE
SURFACE TRANSPORTATION BOARD**

STB FINANCE DOCKET NO. 35160

**OREGON INTERNATIONAL PORT OF COOS BAY
—FEEDER LINE APPLICATION—
COOS BAY LINE
OF THE CENTRAL OREGON & PACIFIC RAILROAD, INC.**

**SUPPLEMENTAL REPLY OF THE
OREGON INTERNATIONAL PORT OF COOS BAY**

Exhibit 3

Bridge Report

DAVID EVANS
AND ASSOCIATES INC

September 26, 2008

Mr. Michael Gaul
Port of Coos Bay
P. O Box 1215
Coos Bay, OR 97420

SUBJECT: COOS BAY RAIL LINK (LINE) BRIDGE CONDITION ASSESSMENT

Dear Mike

Enclosed is the Final Bridge Condition Assessment Report for the Coos Bay Rail Link in accordance with Task 5 of our contract We have completed a review of the 2007 Osmose Railroad Services, Inc. Bridge Inspection Reports and conducted visual inspections of the bridges on the Line We have developed opinions of anticipated bridge costs associated with resuming rail operations, along with short and long-term bridge system costs and costs to remove the bridge system and replace all bridges with new structures This report documents our study methodology and findings

As you know, David Evans and Associates, Inc (DEA) is a national leader in sustainable design and management solutions, and has consistently provided its clients with award-winning approaches to transportation, energy, water resources, and land development design, planning, and management. As a result, the company has consistently ranked among Engineering News Record's Top 100 Pure Design firms in the U S and among the leaders in many of its local markets

We have extensive experience in transportation projects, especially in Oregon, and have the capability to provide design-build services for our projects In July 2008, the ODOT Rail Division retained our to firm prepare a Bridge Condition Study on 331 significant (length greater than 100 feet) short line railroad bridges, which included bridges from nearly all short lines in the state. Our cost estimates are based upon our extensive experience with bridge work in the Pacific Northwest, as well as experience derived from ODOT Rail's Bridge Condition Study

In the last two years, we have successfully delivered design and construction engineering services for six Coos County bridges. We are a recognized leader for steel truss bridge rehabilitation in Oregon and have most recently been selected to provide professional design and construction engineering services for the rehabilitation of the Coos Bay Railroad Bridge, which is a significant steel truss bridge We have a unique understanding of the cost of construction in Coos County For more about DEA, please visit our web site at www.deainc com.

If you have any questions, please call me at (503) 361-8635

Sincerely,

DAVID EVANS AND ASSOCIATES, INC.

Jeff Parker, P E.
Project Manager

cc: Sandra Brown, Troutman Sanders LLP

Coos Bay Rail Link Bridge Condition Assessment

9/26/08

REGISTERED PROFESSIONAL ENGINEER
19,472
OREGON
SEPT. 16, 1997
JEFFREY ALLEN PARKER

12/31/08

Prepared for:

Oregon International Port of Coos Bay

September 26, 2008

Prepared by:

DAVID EVANS AND ASSOCIATES INC

Project Background

The Oregon International Port of Coos Bay (Port) is seeking to acquire the Coos Bay Rail Link (Line) from the Central Oregon & Pacific Railroad, Inc (CORP) The location of the Line is between milepost 652 114, near Danebo, OR and milepost 763 130, near Cordes, OR The Port retained David Evans and Associates, Inc (DEA) to perform a condition assessment (Study) of the bridges along the Line. The findings of this Study are included and summarized in this report, to be submitted to the Port on September 29, 2008

Purpose and Need for Report

The objective of this report is to provide opinions of costs to bring the 107 bridges located along the Line (reference Attachment 4 for bridge location maps) to a condition that would allow the Line to reopen as well as anticipated short-term and anticipated long-term costs of the bridge system associated with owning and operating the Line

The Study is based upon a visual assessment of the bridges, quantification of repairs based on recommendations noted in bridge inspection reports completed by Osmose Railroad Services, Inc (Osmose) in 2007. and development of an opinion of probable bridge system costs which a new owner may encounter Three costs for each bridge have been evaluated—those anticipated to open the Line to traffic (immediate), those anticipated to occur over for the next 5 years (short-term), and those anticipated to occur beyond 5 years (long-term)

Existing Information

Rail Line Location and History

The following brief narrative is provided for the user of this report to understand, in context, the approximate age of the bridge structures studied and ownership since construction The Line is approximately 111 miles long and located entirely in Oregon, while traversing portions of Coos, Douglas and Lane Counties

The Southern Pacific Railroad (SPRR) opened the Line from Eugene to Marshfield (now know as Coos Bay) in 1916 The section of the Line from Eugene to Coos Bay is the proposed Coos Bay Rail Link SPRR sold the Line on December 31, 1994 to CORP

The existing bridge system was designed and constructed for a Cooper E-50 – E-60 design load This load carrying design capacity is ¾ of a new rail bridge designed today

Osmose Railroad Services, Inc. (Osmose) Bridge Inspection Reports

The Port provided to the Study Team the Bridge Inspection Reports completed by Osmose in 2005 and 2007 Due to the large size of these documents, only the 2007 reports are bound in this report for the Port as Attachment 1 and we understand that the 2007 and 2005 Osmose Reports were included in Volume III and IV respectively of Reply of the Oregon International Port of Coos Bay, filed September 12, 2008

DEA has reviewed existing Bridge Inspection Reports completed by Osmose in 2007 and tabulated prioritized repairs noted in those reports, which were provided by the Port of Coos Bay

Study Organization and Methodology

The primary elements of the Study are

- Existing Osmose data collection and tabulation
- *Bridge Inspections*
- Development of opinions of cost for recommended repairs

Each of these Study activities is described below

Existing Osmose Data Collection and Tabulation

The 2005 and 2007 Osmose Bridge Inspection Reports summarized and prioritized recommended repair work for each bridge This repair work was quantified from both of the inspection reports for each bridge From this work, the Study Team was able to identify the repairs that were recommended in 2007 but not noted for 2005 Note that much of the work identified in the 2005 report as Priority 2 and 3 remains on the 2007 report as maintenance deferred By examination of repair work completed in the 2007 Osmose reports, we estimate approximately less than 1% of the repairs recommended by Osmose in 2005 were completed by the time the 2007 Osmose inspections were conducted. We understand that in November 2007, CORP put forward a cost estimate for Phase I bridge repairs of $6 75 million, which appears to be based on priority 2 repairs, and a cost estimate for Phase II bridge repairs of $3.75 million, which appears to be based on priority 3 repairs. We have been told by the Port's counsel that no detail was provided for these estimates and that the back-up for these estimates was not provided to the Port in response to discovery served on CORP As noted below, DEA has provided summary and detailed estimates for the repairs needed for these bridges by priority based upon 2009 dollars

Bridge Inspections

The Study Team conducted visual inspections of the bridges (with the exception of Bridge No 716.40) on the Line from September 13th to September18th Field reports for the 2008 DEA Visual Inspections are included in Attachment 2 of this report In addition, the Study Team conducted an annual inspection of Bridge No 716 40 and this report is included as Attachment 5 of this report

The following narrative has been included for an understanding of the level of review involved for three general categories of bridge inspection

1 A visual inspection is the basic inspection and is conducted for observation review, no material tests are performed The observations take place from the bridge deck and/or areas accessed by foot below For this Study, visual inspections were conducted to review the Osmose routine Bridge Inspection Reports and to identify obvious additional damage which may have occurred since the Line was embargoed In addition, this visual inspection was conducted to correlate the Study Team's understanding of the bridges' conditions and general state of maintenance with the repair recommendations contained in the Osmose report

2 An annual or biannual routine inspection builds on the visual inspection and is generally the industry standard inspection for routine inspections A structural member condition inventory is assembled for each structural element (beam, column, pile, cap etc)

3 A detailed inspection represents the next level of inspection and is generally conducted prior to a major bridge rehabilitation or in order to establish a safe load capacity A detailed inspection includes the evaluation of each structural element for its condition, which is a more in-depth, time intensive inspection than a routine inspection and can include supplemental equipment to include ladders, mechanical lifts, and boats A detailed inspection can include limited material testing, including limited boring of representative timber members to establish if any interior deterioration is occurring; and for steel, the actual steel thickness is measured to determine the remaining structural section. A structural member condition inventory is assembled for each structural element (beam, column, pile, cap etc) This inspection includes a load capacity analysis based upon

the remaining structural section for each member Calculations and a summary of the load capacity are submitted in a load rating report

None of the inspection categories include underwater inspections unless scour or other problems are noted Both the routine and detailed inspections include an itemization of repairs for each bridge Our teams also prepared itemized repair recommendations and costs for all visually inspected bridges based upon the 2007 Osmose inspection report and any additional data gathered during the visual inspection of each bridge

Cost Estimating

Osmose Bridge Repair Recommendations

The Osmose Bridge Inspection Reports prioritize recommended bridge repair work based on the following designations, which we have also used in our report:

Priority 1 – Emergency: Stop operation over the structure and perform repairs immediately. There are no Priority 1 repairs noted in the 2007 reports The visual inspections by DEA did not find new Priority 1 repairs required for bridges, however, due to ship/bridge unreported accidents, scour associated with high flow events, debris collisions with bridge elements, etc which may occur prior to opening the Line, we recommend the new rail operator conduct a visual track and bridge inspection immediately prior to opening the Line Also, during our visual inspection, slides were noted along the rail Line that stop operations and would need to be cleared and stabilized prior to opening the Line

Priority 2 – Condition is unsafe and could cause failure at any time: Repair as soon as possible Condition must be monitored continually until repairs have been completed Repairs classified as Priority 2 are recommended to be complete prior to opening the Line to rail traffic

Priority 3 – Condition could become unsafe and should be monitored frequently: Repair in the near future

Priority 4 – Condition is substandard and should be monitored. Condition may require repairs within one to five years

Priority 5 – Either no defects or only minor defects were found Repairs not recommended at this time, but condition of structure should be monitored

Rail Operation Considerations Influencing Bridge Costs

The following discussion relates to the costs to immediately open the bridge system to traffic, as well as short- and long-term bridge system costs and how they are influenced heavily by the intended operational plans for the Line If the use of the Line changes and additional capacity (heavier cars and faster speeds) is required, the cost to maintain and improve the Line increases All costs noted in this section (Priority 2, 3, 4, Rehabilitation, Replacement, and Removal) are noted in Figures 1 and 2 located in the Summary of this report More detailed calculations for these costs is contained in Attachment 3 of this report

A railroad with limited freight, seeking to maintain the Line with minimal expenditures, will keep operating with the rail Line under the conditions which existed prior to the embargo, i e E-60 maximum loading, slow speeds less than 10 mph on bridges, all rail cars loaded to meet the E-60 loading capacity, and spacing of cars to avoid having maximum loaded cars adjacent to each other The initial cost to get this bridge system up and running under the operating conditions in place prior to the embargo is the cost of the Priority 2 repairs. In addition, this railroad bridge system may cost approximately $1,200,000 annually to correct new Priority 2 repairs identified during annual bridge inspections However, there will also be unanticipated and indeterminate expenditures This amount is influenced by the continued past practice of deferred maintenance (Priority 3 and 4), which delayed maintenance until they become a Priority 1 or 2 This is the primary assumption for development of costs to begin operations, as well as short-term and long-term bridge costs identified in this report This is the assumption used by railroads to operate a line for profit, with limited revenue or freight This method of management of a bridge system can be maintained indefinitely However, with this method, at some point in time, the continued deterioration of the system will yield unexpected and relatively large expenditures to correct nearly 100 years of deferred maintenance. When this time will arrive is not known However, our opinion is that the largest expenditures will occur when currently designated Priority 3 and 4 repairs for the steel truss spans in the system (especially the Siuslaw and Umpqua River) are deemed by future bridge inspectors to be Priority 1 or 2 When this occurs, in order to maintain operations, the Port can expect large unplanned expenditures, which are impossible to fully quantify or schedule We cannot determine if this point is 5, 10 or 50 years in the future The only way to avoid unanticipated expenditures of a bridge system this age is to proactively invest in the bridges to arrest deterioration and restore the condition of the bridge system by reversing several decades of deferred maintenance.

A railroad with a plan to gradually incorporate improvements to upgrade the Line to E-80 standards, while maintaining current operations at the E-60 maximum, would slowly upgrade the bridge system with the average speed being 30 mph The cars would still be loaded to meet the E-60 loading and require spacing of cars to avoid having cars hauling maximum loads adjacent to each other The initial cost to get this operation up and running would include the Priority 2 and 3 repairs This railroad will cost approximately $750,000 per year to maintain and another $1,750,000 per year for upgrades changing out structures on some sort of priority basis (probably matched to speed) This means current repairs are done to maintain the E-60 standards but portions of the Line would be upgraded to E-80 and higher speeds over a long period of time This method of railroad operations will slowly begin reversing the deferred maintenance of the bridge system

A railroad with an immediate need for increased capacity improvements to upgrade much of the bridge system to a higher standard now, meaning we would still operate with E-60 engines but could handle E 72 rail car loads (286,000 pound cars) on the bridges and tunnels while having a lower speed, the average could start around 25 mph This bridge system would cost approximately $70,000,000 to get up and running, the big change being heavier rail and ties on bridges This would require a more detailed study of the bridges currently carrying the lighter loads to be assured that the current steel bridges could handle the higher loads This bridge system will cost approximately $500,000 per year to maintain and another $1,500,000 per year for upgrades for approximately 15-20 years to finish the upgrade cycle

Cost Estimating Methodology

Opinions for five primary costs (immediate cost to start operation, short-term (within 5 years), long-term (beyond 5 years), rehabilitation, and complete replacement costs) were developed for each bridge Calculations for each of these costs are contained in Attachment 3 of this report In addition, the estimated cost to remove all of the bridges has been calculated These costs have been summarized in Figures No 1 and No 2 of this report

The basis of cost was developed by quantifying the repair recommendations and applying unit costs for each repair In addition, these costs include an allowance for design and construction engineering. All costs assume a competitive bid for the work by qualified general contractors in the spring of 2009 It should be noted that during repair of items recommended in the report, typically other damaged members that may have been hidden are found, thereby increasing the amount of the work from that shown in the report Consistent with industry standard, a construction contingency has been added to all costs to account for this unidentified work All costs in this report are assumed to be 2009 dollars Future budgetary numbers should be increased for inflation accordingly

The 2005 and 2007 Osmose Bridge Inspection Reports summarized and prioritized recommended repair work for each bridge This repair work was quantified from both inspection reports for each bridge From this work, the Study Team was able to identify the repairs that were recommended in 2007 but not noted for 2005 This difference is assumed to represent the incremental deterioration of the Line over a two year span Our visual inspections took place during September 2008 and our understanding is the transfer of ownership for the Line is projected for March 2009. Therefore, there will be six months of additional deterioration of the Line beyond the condition observed by our inspectors in September 2008 The Study Team did consider that a lack of traffic on the

Line, from September 2007 to spring 2009, would generally be favorable for decreased deterioration of the bridge system during this time. However, the traffic on the Line from 2005 to 2007 is considered light and the deterioration of materials accelerate as they age Therefore, these two factors were considered to cancel each other and the base cost of immediate and short-term repairs were increased an amount equal to the difference in recommended repairs and their associated costs from 2005 to 2007 prorated for six months This increase is intended to account for six months of deterioration of the bridge system in the Pacific Northwest climate from the date of our visual inspection in September 2008 to March of 2009 This increase has been calculated to consist of an additional $40,775 of Priority 2 repairs, $81,100 of Priority 3 repairs, and $442,575 of Priority 4 repairs

Another consideration is that while the system is not operating, many repairs can be accomplished more efficiently or cost-effectively and there may be some advantages to accomplishing Priority 3 and 4 repairs at this time Another factor is that aggregating items together to produce large volume contracts can reduce unit prices For instance, removing a stringer while doing track and tie upgrade projects is much easier and should be accomplished at the same time These types of considerations have not been included in the Study at this time, as the methodology of the capital improvement program for this Line has not been established

Cost of bridge system administration is not included in this Study However, this bridge system should be inspected yearly or biennially This annual cost (identified by Osmose) is approximately $50,000 00 dollars per year (2009 cost)

Immediate Bridge Costs to Begin Operations
The basis of the immediate bridge repair costs were developed assuming the Line will have limited freight in the first 5 years with corresponding minimal expenditures for maintenance The following considerations determined our estimated cost to begin bridge system operations.

- We quantified Priority 2 repairs recommended in the 2007 Osmose reports and applied unit costs for each repair
- We quantified repairs identified during the 2008 DEA visual inspections and applied unit costs for each repair
- We have increased the value of the Priority 2 repairs by $40,775 to reflect additional deterioration of the bridge system, which will occur from September 2008 to March 2009
- One year cost to reestablish an annual inspection program is $50,000
- Our routine inspection of Bridge 716 40 (Siuslaw) recommends a load rating be performed on the steel truss spans of this bridge prior to start of operations We have assumed this recommendation would hold true for Bridge 739 68 (Umpqua) Cost for each analysis is $50,000 resulting in a total cost of $100,000

Cost calculations for typical and unique repairs by bridge are included in Attachment 3

The total cost of Osmose and DEA identified Priority 2 repairs is $9,211,395, coupled with the $40,775 of additional repairs anticipated for deterioration, which will occur prior to transfer of Line ownership, $50,000 for inspection, $100,000 for load ratings of Bridge Numbers 716 4 and 739 68 yields a total bridge system cost to begin operations of $9,402,170

Anticipated Short-Term Bridge Costs (Years 2, 3, 4, 5)
The basis of the short-term bridge operating cost was developed by addition of the following considerations

- We assigned a $1,200,000 (2009 dollars) per year for a bridge maintenance budget assuming the Line would be operated to minimize expenditures
- We allowed for $50,000 per year inspection budget.

The total short-term (four total years) costs assuming the Line is managed to minimize expenditures is $5,000,000

Note The short-term bridge costs can be exceeded if Priority 3 and 4 repairs are down-graded to Priority 1 or 2 A conservative upward boundary for short-term costs may be the magnitude of the Priority 3 repairs or $15,000,000 This amount is approximately equal to the risk of operating the system, while minimizing expenditures

Anticipated Long-Term Bridge Costs (Beyond 5 Years from Start of Operation)
The basis of the short-term bridge operating cost was developed by addition of the following considerations

- We assigned a $1,200,000 (2009 dollars) per year for a bridge maintenance budget assuming the Line would be operated to minimize expenditures
- We allowed for $50,000 per year inspection budget.

The long-term costs, assuming the Line is managed to minimize expenditures, is $1,250,000 per year (2009 dollars).

Note The long-term bridge costs can be exceeded if Priority 3 and 4 repairs are down-graded to Priority 1 or 2. A conservative upward boundary for long-term costs may be the magnitude of the Priority 3 and 4 repairs or $30,000,000 This amount is approximately equal to the risk of operating the system, while minimizing expenditures

Rehabilitation of Bridge System
Another reasonable assumption for the long-term bridge costs for a bridge system of this age could be assumed to be the cost to rehabilitate and upgrade the entire bridge system with an increase in capacity and service life This cost is estimated to be approximately $119,000,000 This rehabilitation would indefinitely restore the bridge system for the foreseeable future and reduce or eliminate unplanned expenditures on the Line, as well as reduce or eliminate unplanned loss of service resulting from the discovery of new Priority 1 or 2 repairs These bridge costs are a planning level estimate based upon a competitive bid of the work by qualified contractors Rehabilitation cost calculations are noted in Attachment 3

Replacement Value of Bridge System
The cost to construct this bridge system should the Line need to be reestablished in the future is $400,000,000 This cost is for the bridges only and does not include costs associated with reestablishing the track, ballast, general grading, signals, communication systems, signage, and right of way This cost is presented in 2009 dollars, which will need to be increased for anticipated year of construction These costs are a planning level estimate based upon a competitive bid of the work by qualified contractors In addition, these costs have been increased to provide an allowance for design and construction engineering, as well as a contingency to account for conceptual understanding of the replacement requirements. Replacement calculations are noted in Attachment 3

Removal Cost of Bridge System
Nearly all materials in the existing bridge system are hazardous waste and consist primarily of creosote treated timbers or have lead based paint on the steel The cost to remove and dispose of this bridge system (including contractor mobilization and contingencies) is estimated to be $31,840,725 This cost does not include the cost of permitting the removal of these bridges, which primarily exist in waterways influencing endangered species As discussed in the Reply Verified Statement of Dana Siegfried of DEA filed by the Port on September 12, because

work will need to occur during the approved in-water work windows for these sites, costs for labor during these times will be at a premium In addition, our experience relating to the demolition of a large steel truss over an environmentally sensitive waterway results in our opinion that any bridge removal in Oregon will require work to be isolated from waters, i.e coffer dams, and each truss span will be required to be fully coated (to contain lead), picked up as one piece, moved off site and out of waters or wetlands, and then dismantled and disposed of the lead coated members in a legal manner, followed by removal of the concrete foundations Our removal costs incorporate these factors but do not include removal costs of several generations of treated timber ties and other materials, which have been routinely discarded along the Line over the years Removal cost calculations are included as a part of the replacement calculations noted above and are included in Attachment 3

Summary

Priority 2-3-4, rehabilitation, replacement, and removal costs for the bridge system are summarized by bridge in Figures No 1 and 2 All costs are calculated for 2009 construction. There is no additional allowance for inflation due to construction in subsequent years

Rehabilitation expenditures will reduce the Port's exposure to unplanned expenditures, interruptions of service, as well as increase the systems' capacity

Abbreviations used in Figures 1 and 2 below

AR	Arch	PCI	Prestressed concrete "I" beam
BD	Ballast deck trestle	PCB	Prestressed concrete box
BM	Beam span	PCS	Prestressed concrete slab
CTG	Concrete "T" girder	RCS	Reinforced concrete slab
CB	Concrete box	IB	Steel "I" beam
CBG	Concrete box girder	SBS	Steel beam span
CS	Concrete slab	SPT	Steel pile trestle
DPT	Deck pinned truss	TPCT	Thru pinned connected truss
DPG	Deck plate girder	TPT	Thru pinned truss
DPLG	Deck plate lattice girder	TPG	Thru plate girder
DRT	Deck riveted truss	TRT	Thru riveted truss
FT	Frame trestle-all timber	WFB	Wide flange beam
OD	Open deck	WFBS	Wide flange beam span
PT	Pile trestle-all timber	WSP	Wide steel beam

Coos Bay Rail Link Bridge Cost Summary Figure No. 1

	EXISTING BRIDGE			PRIORITY LEVEL COSTS			OVERALL TOTAL COSTS	
BRIDGE LOCATION	STRUCTURE DESCRIPTION	YEAR BUILT	SPANS OVER	PRIORITY 2 TOTAL	PRIORITY 3 TOTAL	PRIORITY 4 TOTAL	REHABILITATION TOTAL	REPLACEMENT TOTAL
652.21	120 ft OD PT	1940	Amazon creek	$161,760	$2,400	$39,200	$396,000	$859,815
652.58	8 ft OD PT		Drainage	$0	$12,800	$0	$0	$57,321
656.12	100 ft OD TRT	1912	Coyote Creek	$0	$14,875	$59,500	$907,500	$3,403,125
657.12	120 ft OD PT	1941	Coyote Creek	$12,800	$25,760	$32,960	$396,000	$859,815
657.96	30 ft BD PT	1927	Coyote Creek	$0	$0	$29,120	$99,000	$214,954
658.17	120 ft OD SPT	1923	Water	$46,240	$16,640	$17,120	$594,000	$948,915
660 89	90 ft OD PT	1943	Drainage	$12,800	$16,320	$26,080	$297,000	$644,861
661.28	90 ft OD PT, 63 ft OD TPG, 90 ft OD PT	1932, 1914, & 1932	Long Tom Creek	$12,800	$102,880	$105,280	$1,009,800	$2,448,245
661.73	135 ft OD PT	1934	Long Tom Overflow	$0	$27,200	$52,640	$445,500	$967,292
662.59	345 ft OD PT	1936	Long Tom Overflow	$52,000	$120,320	$87,360	$1,138,500	$2,471,968
664.00	100 ft OD TRT, 135 ft BD PT	1914 & 1926	Long Tom Creek	$56,000	$216,125	$5,250	$1,397,550	$4,616,884
664.62	90 ft OD PT, 100 ft OD TRT, 90 ft OD PT	1939, 1914, & 1939	Long Tom Creek	$14,000	$88,900	$76,650	$1,560,900	$4,971,557
664.85	75 ft OD PT, 100 ft OD TRT, 75 ft OD PT	1939, 1914, & 1939	Long Tom Creek	$35,000	$118,125	$30,800	$1,452,000	$4,735,108
665 49	105 ft OD PT, 100 ft OD TRT, 90 ft OD PT	1933, 1914, & 1933	Elk Creek	$15,750	$45,500	$23,975	$1,615,350	$5,089,782
666.21	60 ft BD PT	1930	over Rd.	$1,600	$0	$16,000	$198,000	$443,891
667.28	75 ft OD PT	1928	Drainage	$0	$22,400	$20,160	$247,500	$537,384
667.40	90 ft OD PT, 160 ft OD DPG, 45 ft OD PT	1933, 1914, & 1934	Noti Creek and Vaughn Rd	$427,200	$107,200	$70,720	$1,501,500	$2,232,512
668.50	154 ft OD PT, 120 ft OD DPG, 90 ft OD PT	1933, 1944, & 1921	Noti Creek	$104,160	$55,040	$54,880	$1,597,200	$2,779,788
671.89	90 ft OD PT	1943	over RD	$0	$29,920	$67,840	$297,000	$665,837
674.03	30 ft OD PT	1956	Stream	$22,720	$320	$18,560	$99,000	$214,954
676.23	60 ft OD DPG	1913	Chikkahominy Creek	$32,640	$11,200	$0	$396,000	$1,054,350
677.05	60 ft OD SPT	1914	Walker Creek	$2,400	$45,120	$16,320	$297,000	$474,458
677.80	56 ft OD PT, 80 ft OD TPG, 45 ft OD PT	1932, 1914, & 1951	Wild Cat Creek	$0	$55,840	$29,120	$861,300	$2,194,818
678 43	75 ft OD PT, 122 ft OD TPG, 45 ft OD PT	1921, 1914, & 1927	Wild Cat Creek	$8,000	$193,600	$53,280	$1,201,200	$3,103,304
680.17	150 ft OD TRT	1914	Wild Cat Creek	$0	$71,050	$24,500	$1,361,250	$5,817,075
680.46	102 ft OD TPG	1914	Wild Cat Creek	$80,000	$326,400	$2,400	$673,200	$2,903,175
680 77	102 ft OD TPG	1914	Wild Cat Creek	$40,000	$42,080	$0	$673,200	$2,903,175

Coos Bay Rail Link Bridge Cost Summary Figure No. 1

	EXISTING BRIDGE			PRIORITY LEVEL COSTS			OVERALL TOTAL COSTS	
BRIDGE LOCATION	STRUCTURE DESCRIPTION	YEAR BUILT	SPANS OVER	PRIORITY 2 TOTAL	PRIORITY 3 TOTAL	PRIORITY 4 TOTAL	REHABILITATION TOTAL	REPLACEMENT TOTAL
681.05	162 ft OD TPG	1914	Wild Cat Creek	$83,200	$6,400	$82,400	$1,069,200	$2,979,059
681 45	222 ft OD DPG	1914	Wild Cat Creek	$104,800	$160,800	$2,400	$1,465,200	$4,082,414
682.18	200 ft OD TPG, 50 ft OD DPG	1914	Siuslaw River	$88,000	$148,800	$116,000	$1,650,000	$6,360,131
683.36	155 ft OD TPG, 200 ft OD TRT, 120 ft OD TPG	1914	Siuslaw River	$98,175	$20,125	$10,150	$3,811,500	$15,945,909
687.03	65 ft OD PT	1922	Rock Creek	$0	$63,680	$32,320	$214,500	$465,733
687.88	90 ft OD PT	1922	Meadow Creek	$12,160	$45,920	$25,760	$297,000	$644,861
689.23	15 ft BD PT	1926	Creek	$640	$8,000	$3,200	$0	$102,713
690.47	45 ft OD TPG	1914	San Antonio Creek	$22,560	$2,400	$0	$297,000	$341,550
690.85	64 ft OD TPG, 114 ft OD TRT, 108 ft OD TPG	1914	Siuslaw River	$29,400	$39,025	$220,850	$2,283,270	$8,124,612
691.05	70 ft OD DPG, 250 ft OD TRT, 135 ft OD PT	1914 & 1934	Siuslaw River	$259,875	$279,125	$476,000	$3,267,000	$11,970,356
691.38	15 ft OD FT	1914	Creek	$8,000	$12,800	$960	$0	$102,713
692 06	16 ft BD PT		Creek	$32,000	$0	$12,800	$0	$109,560
693.27	75 ft BD PT	1928	Creek	$640	$21,760	$12,960	$247,500	$537,384
694.32	150 ft OD PT, 200 ft OD TPT, 90 ft OD PT	1936, 1914, & 1925	Siuslaw River	$458,850	$344,050	$126,175	$2,686,200	$9,886,668
694.78	90 ft OD DPG, 150 ft OD TRT, 90 ft OD DPG	1914	Siuslaw River	$216,300	$304,938	$810,250	$2,668,050	$9,296,430
694.98	15 ft OD FT	1914	Creek	$0	$20,160	$0	$0	$102,713
696.66	75 ft BD FT, 150 ft OD TRT, 135 ft OD PT	1914, 1914, & 1921	Lake Creek	$3,325	$62,300	$154,175	$2,123,550	$7,696,825
700.37	120 ft OD PT	1939	Thompson Creek	$10,400	$76,480	$26,560	$396,000	$859,815
702.65	135 ft OD PT	1938	Creek	$37,600	$13,600	$17,280	$445,500	$967,292
702.95	60 ft OD PT	1946	Creek	$22,720	$22,400	$0	$198,000	$429,908
710.20	105 ft BD PT	1925	Olsen Creek	$35,520	$14,400	$30,880	$346,500	$752,338
711.37	75 ft BD PT	1928	Creek	$19,040	$800	$30,080	$247,500	$537,384
711.67	75 ft BD PT	1931	Creek	$24,000	$27,200	$34,400	$247,500	$537,384
712.16	60 ft BD PT	1926	Creek	$8,000	$20,160	$42,720	$198,000	$429,908
712.80	60 ft OD PT	1927	Creek and Access Rd	$34,400	$20,160	$19,200	$198,000	$429,908
716.40	4 ft OD TPG, 2670 ft OD PT, 400 ft OD TPT, 284 ft OD TR	1933, 1933, 1915, & 1931	Siuslaw river	$2,462,040	$2,408,175	$884,450	$16,327,740	$69,877,691
718 12	30 ft BD CB	1975	slough	$8,000	$0	$12,800	$0	$0
719.07	105 ft OD PT	1932	Creek and Private Access	$64,320	$63,360	$26,560	$346,500	$752,338
719.21	315 ft OD PT	1939	Private Access and Marsh	$154,240	$117,760	$98,240	$1,039,500	$2,257,014
724.22	120 ft BD CB	1970	Maple Creek	$8,000	$12,800	$0	$0	$0
725.96	646 ft OD PT	1975	Lake Siltcoos	$61,120	$29,440	$17,600	$2,131,800	$4,628,671

Coos Bay Rail Link Bridge Cost Summary Figure No. 1

BRIDGE LOCATION	EXISTING BRIDGE STRUCTURE DESCRIPTION	YEAR BUILT	SPANS OVER	PRIORITY LEVEL COSTS PRIORITY 2 TOTAL	PRIORITY 3 TOTAL	PRIORITY 4 TOTAL	OVERALL TOTAL COSTS REHABILITATION TOTAL	REPLACEMENT TOTAL
726.31	990 ft OD PT	1973	Lake Siltcoos	$481,440	$125,120	$260,800	$3,267,000	$7,093,474
727.35	1200 ft BD CB	1977	Lake Siltcoos	$7,040	$800	$0	$0	$0
728.51	270 ft OD PT	1930	Lake Siltcoos	$96,320	$177,280	$57,120	$891,000	$1,934,584
729.04	390 ft OD PT	1932	Wetland	$198,080	$132,320	$166,560	$1,287,000	$2,794,399
729.17	480 ft BD CB	1981	Lake Tahkenitch	$7,360	$12,800	$0	$0	$0
730.56	990 ft OD PT, 120 ft OD CB, 102 ft OD DPG	1953, 1915, & Steel 1915	Lake Tahkenitch	$96,000	$449,920	$376,960	$4,534,200	$17,798,839
731.65	945 ft OD PT, 102 ft OD DPG, 1245 ft OD PT	1960, 1918, & 1915	Lake Tahkenitch	$49,280	$1,082,560	$776,000	$7,900,200	$17,567,327
732.84	375 ft OD PT, 28 ft OD DPG, 228 ft OD PT	1915, 1915, & 1944	Lake Tahkenitch	$30,720	$252,960	$219,520	$2,174,700	$4,541,984
733.88	1120 ft BD CB	1980	Lake Tahkenitch	$0	$12,800	$0	$0	$0
733.95	1178 ft BD CB	1980	Lake Tahkentich	$6,400	$21,200	$0	$0	$0
735.86	80 ft OD PT	1931	Wetland	$57,920	$27,200	$49,280	$264,000	$573,210
736 03	50 ft OD PT	1926	Jack Frank creek	$27,520	$41,600	$17,600	$165,000	$358,256
736.51	48 ft OD PT	1926	Grade Separation	$0	$28,160	$39,520	$158,400	$314,820
737.33	90 ft BD PT	1931	Jack Franz Creek	$0	$0	$43,040	$297,000	$644,861
738 70	30 ft OD PT	1927	Grade Separation	$58,400	$36,640	$32,960	$99,000	$196,763
738.94	405 ft OD PT	1915	Smith River slough	$3,840	$97,440	$83,200	$1,336,500	$2,901,876
739.14	375 ft OD PT, 50 ft OD TPG, 165 ft OD PT	1937, 1915, & 1915	Smith River slough	$154,400	$396,960	$132,800	$2,112,000	$4,264,549
739.43	288 ft OD PT, 92 ft OD TPG, 119 ft OD PT	1915	Smith River slough	$61,120	$145,600	$141,600	$1,950,300	$4,608,017
739.68	80 ft OD PT, 1125 ft OD TPT, 360 ft OD TPT, 60 ft OD PT	1915	Umpqua River	$1,698,200	$4,922,750	$5,524,400	$13,984,575	$85,714,419
740.25	60 ft OD PT	1914	over Rd	$16,000	$3,200	$31,200	$198,000	$443,891
740.84	60 ft OD PT	1980	Scofield creek	$2,400	$12,800	$0	$198,000	$443,891
741.35	60 ft OD PT	1915	Creek	$7,360	$34,720	$33,760	$198,000	$429,908
741.74	45 ft OD PT	1915	Creek	$23,680	$37,120	$31,360	$148,500	$322,431
742 05	45 ft OD PT	1915	Creek - Wetland	$0	$65,120	$8,000	$148,500	$322,431
742.24	120 ft OD PT	1928	Creek - Wetland	$0	$14,400	$64,960	$396,000	$859,815
742.72	135 ft OD PT	1915	Scofield creek	$0	$21,120	$89,120	$445,500	$967,292
742 95	60 ft OD PT	1936	Creek	$0	$65,760	$18,560	$198,000	$429,908
743.20	45 ft BD PT	1929	Grade Separation	$0	$36,160	$10,400	$148,500	$295,144
743.73	135 ft OD PT	1934	Scofield creek	$238,400	$54,560	$50,240	$445,500	$967,292
743.88	120 ft OD PT	1934	Scofield creek	$12,800	$91,200	$42,080	$396,000	$859,815
743.97	105 ft OD PT	1932	Scofield creek	$8,240	$94,720	$77,760	$346,500	$752,338

Coos Bay Rail Link Bridge Cost Summary Figure No. 1

	EXISTING BRIDGE			PRIORITY LEVEL COSTS			OVERALL TOTAL COSTS	
BRIDGE LOCATION	STRUCTURE DESCRIPTION	YEAR BUILT	SPANS OVER	PRIORITY 2 TOTAL	PRIORITY 3 TOTAL	PRIORITY 4 TOTAL	REHABILITATION TOTAL	REPLACEMENT TOTAL
744.24	75 ft BD PT	1929	Wind creek	$400	$10,560	$24,800	$247,500	$537,384
744.44	75 ft BD PT	1929	Wind creek	$0	$7,200	$3,200	$247,500	$537,384
744.70	75 ft BD PT	1929	Wind creek	$0	$3,200	$25,760	$247,500	$537,384
744.83	75 ft BD PT	1929	Wind creek	$0	$0	$13,600	$247,500	$537,384
748.06	90 ft BD PT	1931	Small Creek	$14,720	$0	$0	$297,000	$644,861
748.44	30 ft BD PT	1929	Small Creek	$0	$0	$24,800	$99,000	$214,954
748.68	75 ft OD FT	1915	Small Creek	$89,760	$26,400	$39,680	$247,500	$537,384
749.89	930 ft BD CB	1978	Black Lake	$7,040	$12,800	$0	$0	$0
750.46	960 ft OD PT, 60 ft OD SBS, 513 ft OD PT	1930, 1915, & 1930	North Lake	$29,600	$139,200	$8,160	$5,256,900	$11,657,584
751.02	320 ft OD PT	1915	North Lake	$32,000	$25,600	$28,320	$1,056,000	$2,292,840
752.99	180 ft OD PT	1932	Ten Mile creek	$0	$16,000	$35,200	$594,000	$1,289,723
753.48	105 ft OD PT	1932	Grade Separation	$12,800	$5,440	$20,400	$346,500	$688,669
753.97	41 ft OD SBS	1929	over hwy	$800	$0	$10,400	$270,600	$311,782
755.63	75 ft OD PT	1940	Clear Lake	$8,160	$12,800	$33,920	$247,500	$537,384
756.13	75 ft OD FT	1915	Saunders Lake	$20,000	$16,000	$3,200	$247,500	$537,384
756.55	75 ft OD PT		Saunders Lake	$64,000	$59,200	$42,240	$247,500	$537,384
757.37	75 ft OD PT	1915	Butterfield Lake	$57,120	$13,600	$20,160	$247,500	$537,384
761.13	45 ft OD SPT	1912	Tidal Creek	$26,880	$61,760	$8,160	$222,750	$355,843
			PRIORITY SUBTOTAL	$9,211,395	$15,039,783	$13,007,685	$118,973,085	$399,517,887
			Estimated Increased Repair Costs for 6 Months of Additional Deterioration to Projected Ownership Transfer March 2009	$40,775	$81,100	$442,575		
			TOTAL COST	$9,252,170	$15,120,883	$13,450,260		

Coos Bay Rail Link Bridge Removal Cost Summary   Figure No. 2

BRIDGE LOCATION	EXISTING BRIDGE: STRUCTURE DESCRIPTION	YEAR BUILT	SPANS OVER	OVERALL REMOVAL COSTS: TOTAL
652 21	120 ft OD PT	1940	Amazon creek	$36,000
652 58	8 ft OD PT		Drainage	$2,400
656.12	100 ft OD TRT	1912	Coyote Creek	$125,000
657 12	120 ft OD PT	1941	Coyote Creek	$36,000
657 96	30 ft BD PT	1927	Coyote Creek	$9,000
658 17	120 ft OD SPT	1923	Water	$90,000
660 89	90 ft OD PT	1943	Drainage	$27,000
661 28	90 ft OD PT, 63 ft OD TPG, 90 ft OD PT	1932, 1914, & 1932	Long Tom Creek	$101,250
661 73	135 ft OD PT	1934	Long Tom Overflow	$40,500
662 59	345 ft OD PT	1936	Long Tom Overflow	$103,500
664 00	100 ft OD TRT, 135 ft BD PT	1914 & 1926	Long Tom Creek	$165,500
664 62	90 ft OD PT, 100 ft OD TRT, 90 ft OD PT	1939, 1914, & 1939	Long Tom Creek	$179,000
664.85	75 ft OD PT, 100 ft OD TRT, 75 ft OD PT	1939, 1914, & 1939	Long Tom Creek	$170,000
665 49	105 ft OD PT, 100 ft OD TRT, 90 ft OD PT	1933, 1914, & 1933	Elk Creek	$183,500
666 21	60 ft BD PT	1930	over Rd	$37,500
667 28	75 ft OD PT	1928	Drainage	$22,500
667 40	90 ft OD PT, 160 ft OD DPG, 45 ft OD PT	1933, 1914, & 1934	Noti Creek and Vaughn Rd	$160,500
668 50	154 ft OD PT, 120 ft OD DPG, 90 ft OD PT	1933, 1944, & 1921	Noti Creek	$213,250
671 89	90 ft OD PT	1943	over RD	$56,250
674 03	30 ft OD PT	1956	Stream	$9,000
676 23	60 ft OD DPG	1913	Chikkahominy Creek	$45,000
677 05	60 ft OD SPT	1914	Walker Creek	$45,000
677 80	56 ft OD PT, 80 ft OD TPG, 45 ft OD PT	1932, 1914, & 1951	Wild Cat Creek	$90,300
678 43	75 ft OD PT, 122 ft OD TPG, 45 ft OD PT	1921, 1914, & 1927	Wild Cat Creek	$127,500
680 17	150 ft OD TRT	1914	Wild Cat Creek	$630,000
680 46	102 ft OD TPG	1914	Wild Cat Creek	$76,500
680 77	102 ft OD TPG	1914	Wild Cat Creek	$76,500

Coos Bay Rail Link Bridge Removal Cost Summary Figure No. 2

BRIDGE LOCATION	EXISTING BRIDGE: STRUCTURE DESCRIPTION	EXISTING BRIDGE: YEAR BUILT	EXISTING BRIDGE: SPANS OVER	OVERALL REMOVAL COSTS: TOTAL
681 05	162 ft OD TPG	1914	Wild Cat Creek	$121,500
681 45	222 ft OD DPG	1914	Wild Cat Creek	$166,500
682 18	200 ft OD TPG, 50 ft OD DPG	1914	Siuslaw River	$187,500
683.36	155 ft OD TPG, 200 ft OD TRT, 120 ft OD TPG	1914	Siuslaw River	$456,250
687 03	65 ft OD PT	1922	Rock Creek	$19,500
687 88	90 ft OD PT	1922	Meadow Creek	$27,000
689 23	15 ft BD PT	1926	Creek	$4,500
690 47	45 ft OD TPG	1914	San Antonio Creek	$33,750
690 85	64 ft OD TPG, 114 ft OD TRT, 108 ft OD TPG	1914	Siuslaw River	$271,500
691 05	70 ft OD DPG, 250 ft OD TRT, 135 ft OD PT	1914 & 1934	Siuslaw River	$405,500
691 38	15 ft OD FT	1914	Creek	$4,500
692.06	16 ft BD PT		Creek	$4,800
693 27	75 ft BD PT	1926	Creek	$22,500
694.32	150 ft OD PT, 200 ft OD TPT, 90 ft OD PT	1936, 1914, & 1925	Siuslaw River	$912,000
694 78	90 ft OD DPG, 150 ft OD TRT, 90 ft OD DPG	1914	Siuslaw River	$765,000
694 98	15 ft OD FT	1914	Creek	$4,500
696 66	75 ft BD FT, 150 ft OD TRT, 135 ft OD PT	1914, 1914, & 1921	Lake Creek	$693,000
700 37	120 ft OD PT	1939	Thompson Creek	$36,000
702.65	135 ft OD PT	1938	Creek	$40,500
702 95	60 ft OD PT	1946	Creek	$18,000
710 20	105 ft BD PT	1925	Olsen Creek	$31,500
711 37	75 ft BD PT	1928	Creek	$22,500
711 67	75 ft BD PT	1931	Creek	$22,500
712 16	60 ft BD PT	1926	Creek	$18,000
712 80	60 ft OD PT	1927	Creek and Access Rd	$18,000
716 40	54 ft OD TPG, 2670 ft OD PT, 400 ft OD TPT, 284 ft OD TRT	1933, 1933, 1915, & 1931	Siuslaw river	$3,714,300
718 12	30 ft BD CB	1975	slough	$0
719 07	105 ft OD PT	1932	Creek and Private Access	$31,500
719 21	315 ft OD PT	1939	Private Access and Marsh	$94,500
724.22	120 ft BD CB	1970	Maple Creek	$0
725.96	646 ft OD PT	1975	Lake Siltcoos	$193,800

Coos Bay Rail Link Bridge Removal Cost Summary Figure No. 2

BRIDGE LOCATION	EXISTING BRIDGE			OVERALL REMOVAL COSTS
	STRUCTURE DESCRIPTION	YEAR BUILT	SPANS OVER	TOTAL
726 31	990 ft OD PT	1973	Lake Siltcoos	$297,000
727 35	1200 ft BD CB	1977	Lake Siltcoos	$0
728.51	270 ft OD PT	1930	Lake Siltcoos	$81,000
729.04	390 ft OD PT	1932	Wetland	$117,000
729.17	480 ft BD CB	1981	Lake Tahkenitch	$0
730 56	990 ft OD PT, 120 ft OD CB, 102 ft OD DPG	1953, 1915, & Steel 1915	Lake Tahkenitch	$409,500
731 65	945 ft OD PT, 102 ft OD DPG, 1245 ft OD PT	1960, 1918, & 1915	Lake Tahkenitch	$733,500
732 84	375 ft OD PT, 28 ft OD DPG, 228 ft OD PT	1915, 1915, & 1944	Lake Tahkenitch	$201,900
733 88	1120 ft BD CB	1980	Lake Tahkenitch	$0
733 95	1178 ft BD CB	1980	Lake Tahkenitch	$0
735 86	80 ft OD PT	1931	Wetland	$24,000
736 03	50 ft OD PT	1926	Jack Frank creek	$15,000
736 51	48 ft OD PT	1926	Grade Separation	$14,400
737 33	90 ft BD PT	1931	Jack Franz Creek	$27,000
738 70	30 ft OD PT	1927	Grade Separation	$9,000
738 94	405 ft OD PT	1915	Smith River slough	$121,500
739 14	375 ft OD PT, 50 ft OD TPG, 165 ft OD PT	1937, 1915, & 1915	Smith River slough	$199,500
739 43	288 ft OD PT, 92 ft OD TPG, 119 ft OD PT	1915	Smith River slough	$191,100
739 68	80 ft OD PT, 1125 ft OD TPT, 360 ft OD TPT, 60 ft OD PT	1915	Umpqua River	$6,279,000
740 25	60 ft OD PT	1914	over Rd	$37,500
740 84	60 ft OD PT	1980	Scofield creek	$37,500
741 35	60 ft OD PT	1915	Creek	$18,000
741 74	45 ft OD PT	1915	Creek	$13,500
742.05	45 ft OD PT	1915	Creek - Wetland	$13,500
742 24	120 ft OD PT	1926	Creek - Wetland	$36,000
742 72	135 ft OD PT	1915	Scofield creek	$40,500
742 95	60 ft OD PT	1936	Creek	$18,000
743 20	45 ft BD PT	1929	Grade Separation	$13,500
743 73	135 ft OD PT	1934	Scofield creek	$40,500
743 88	120 ft OD PT	1934	Scofield creek	$36,000
743 97	105 ft OD PT	1932	Scofield creek	$31,500

Coos Bay Rail Link Bridge Removal Cost Summary   Figure No. 2

BRIDGE LOCATION	EXISTING BRIDGE			OVERALL REMOVAL COSTS
	STRUCTURE DESCRIPTION	YEAR BUILT	SPANS OVER	TOTAL
744 24	75 ft BD PT	1929	Wind creek	$22,500
744 44	75 ft BD PT	1929	Wind creek	$22,500
744 70	75 ft BD PT	1929	Wind creek	$22,500
744 83	75 ft BD PT	1929	Wind creek	$22,500
748.06	90 ft BD PT	1931	Small Creek	$27,000
748 44	30 ft BD PT	1929	Small Creek	$9,000
748 68	75 ft OD FT	1915	Small Creek	$22,500
749 89	930 ft BD CB	1978	Black Lake	$0
750 46	960 ft OD PT, 60 ft OD SBS, 513 ft OD PT	1930, 1915, & 1930	North Lake	$486,900
751 02	320 ft OD PT	1915	North Lake	$96,000
752 99	180 ft OD PT	1932	Ten Mile creek	$54,000
753 48	105 ft OD PT	1932	Grade Separation	$31,500
753 97	41 ft OD SBS	1929	over hwy	$30,750
755 63	75 ft OD PT	1940	Clear Lake	$22,500
756 13	75 ft OD FT	1915	Saunders Lake	$22,500
756.55	75 ft OD PT		Saunders Lake	$22,500
757 37	75 ft OD PT	1915	Butterfield Lake	$22,500
761 13	45 ft OD SPT	1912	Tidal Creek	$33,750
			OVER WATER	$20,959,250
			OVER ROADWAY	$199,500
			OVER LAND	$68,400
			SUBTOTAL	$21,227,150
			10% MOBILIZATION	$2,122,715
			40% CONSTRUCTION CONTINGENCIES	$8,490,860
			TOTAL COST	$31,840,725

PUBLIC VERSION

223704

BEFORE THE
SURFACE TRANSPORTATION BOARD

STB FINANCE DOCKET NO. 35160

OREGON INTERNATIONAL PORT OF COOS BAY
—FEEDER LINE APPLICATION—
COOS BAY LINE
OF THE CENTRAL OREGON & PACIFIC RAILROAD, INC.

SUPPLEMENTAL REPLY OF THE
OREGON INTERNATIONAL PORT OF COOS BAY

Exhibit 4

Tunnel Report

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

ALASKA
CALIFORNIA
COLORADO
FLORIDA
MISSOURI
OREGON
WASHINGTON

September 26, 2008

Ms. Betsy Imholt, ODOT Rail Study Director
ODOT Rail Division
555 13th Street NE, Suite 3
Salem, OR 9731-4179

RE: ODOT RAIL STUDY – CENTRAL OREGON AND PACIFIC RAILROAD, COOS BAY SUBDIVISION

Dear Ms. Imholt:

As per your e-mailed approval and direction on September 9, 2008, we have coordinated with Rail America and the Central Oregon and Pacific Railroad (CORP) to visit a limit of four of the nine tunnels on the Coos Bay Subdivision. The Coos Bay Alignment and tunnels are shown in Figure 1, and more detailed locations of each of the nine tunnels along the alignment are shown in Figures 2 through 8. This letter documents our assessment of changes that have occurred in Tunnel Nos. 13, 15, 17, and 18 since we prepared an earlier report to Rail America dated July 16, 2007, entitled, *"Tunnel Inventory – Coos Bay Subdivision, Oregon," that they subsequently* made public. We have also included and updated Tables 1 through 11 to reflect increases in estimated costs to reflect cost escalations since our report of 2007

As per your authorization, we performed a field review and updated our condition assessments for Tunnel Nos. 13, 15, 17, and 18 on September 12 and 13. CORP staff provided flagging services and designated a railroad employee to escort and provide access via hy-rail to the Shannon & Wilson, Inc. field crew during the tunnel visits. We visited and logged Tunnels 13 and 15 on September 12 and Tunnels 17 and 18 on September 13. The portals to all four tunnels were blocked with locked chain link fence panels; however, in past months vandals had detached the gates in order to run vehicles, possibly recreational all-terrain vehicles (ATVs), through Tunnel 13.

The tunnel review process was undertaken by our project manager, Robert Robinson, and senior engineering geologist, Klaus Winkler, both of whom had previously visited all nine tunnels in order to develop the 2007 tunnel condition assessment report for Rail America.

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During our review process, we noted minor changes in the nature and condition of the tunnel support system and the condition and stability of the rock, where visible.

As stated and described in detail in our tunnel inventory report dated July 2007, we identified and classified numerous sections in the tunnels that are in various states of deterioration and, in our opinion, require immediate (within six months) to long-term (30 to 48 months) rehabilitation work in order to reduce the currently high risk of rock falls and timber collapses to more acceptable levels.

Since November 2006, minor rock falls and isolated failed timber sets were observed in tunnels in the Coos Bay Subdivision:

- Tunnel 13
  - At Station 14+00, five timber ribs that were previously logged as rotted and settled by 6 inches have settled an additional 6 inches and kicked inward by approximately 6 inches.
  - Approximately 5 to 10 percent of the wood foot-blocks have rotated due to ATV traffic in the drainage ditches.
  - Several small 1 cubic foot to 1 cubic yard (cy) rock and wood debris falls.

- Tunnel 15
  - Station 15+40 west post shifted off foot-block.
  - Station 19+80 rockfall through hole in shotcrete arch of approximately 1 cy.

- Tunnel 17
  - No significant changes in last year.

- Tunnel 18
  - No significant changes in last year.

In our opinion, the repairs recommended for tunnel sections that were classified as Repair Level 1 and 2 in our July 2007 report are necessary to reinstate relatively safe train passage. The risk of future rockfalls and failing timber sets is high under the current condition of the tunnels. However, the increased seepage rate in some areas of the tunnels that normally accompanies the rainy season will contribute to an increased risk of instability and also makes the application of remedial shotcrete in these seepage areas impossible and hazardous. Consequently, it may not be safe for much of the repair work to be undertaken until the drier months of spring and summer.

We appreciate the opportunity to work with you and look forward to answering any questions you have about the information in this report.

Sincerely,

SHANNON & WILSON, INC.

Robert A. Robinson

Robert A. Robinson
Senior Vice President
Director of Underground Services

RAR/rar

Enclosures: Table 1 – List of Tunnels – Coos Bay Subdivision
Table 2 – Tunnel 13
Table 3 – Tunnel 14
Table 4 – Tunnel 15
Table 5 – Tunnel 16
Table 6 – Tunnel 17
Table 7 – Tunnel 18
Table 8 – Tunnel 19
Table 9 – Tunnel 20
Table 10 – Tunnel 21
Table 11 – Estimated Construction Cost Summary
Figure 1 – Vicinity Map, Coos Bay Branch
Figure 2 – Vicinity Map, Tunnel 13
Figure 3 – Vicinity Map, Tunnel 14
Figure 4 – Vicinity Map, Tunnel 15 and 16
Figure 5 – Vicinity Map, Tunnel 17
Figure 6 – Vicinity Map, Tunnel 18
Figure 7 – Vicinity Map, Tunnel 19
Figure 8 – Vicinity Map, Tunnel 20 and 21

ODOT RAIL STUDY
LIST OF TUNNELS - Coos Bay Subdivision

RAILROAD	TUNNEL NO.	MILEPOST @ N PORTAL	LINE	LAT.	LONG.	Tunnel Liner	Condition	TOTAL LENGTH	LENGTH OF TANGENT	LENGTH OF CURVE	DEGREE OF CURVE	Comments
CORP	13	669 47	Coos Bay	44 0279	123 4649	Timber sets, shotcreted steel sets, steel sets with timber lagging, 100 ft unlined, 55 ft concrete portal barrels	Poor - Good	2,496 ft	South 1732	North 755	8°	Rotting timber sets and lagging
CORP	14	681 09	Coos Bay	43 9998	123 6376	Shotcreted steel sets, shotcreted bedrock. 50 ft N portal concrete barrel	Good	471 ft	0	471	8°	Thin shotcrete, cracking and spalling
CORP	15	720 73	Coos Bay	43 9291	124 0408	Shotcrete over steel and timber sets timber sets and lagging, N & S portal are 50 ft long concrete barrels	Poor - Good	2,143 ft	South 2086	North 57	4°	Rotting timber sets and lagging, several cave-ins, recent repair work
CORP	16	721 52	Coos Bay	43 925	124 0298	Shotcrete over timber and steel sets, N & S portal are 50 ft long concrete barrels	Good	633 ft	0	617	7°	
CORP	17	727 7	Coos Bay	43 8516	124 0859	Shotcrete over bedrock, timber sets, shotcreted steel sets N & S portal concrete barrels	Poor - Good	1,200 ft	North 958	South 242	2°	Timber sets with rotting footblocks, offsets, cracks in shotcrete
CORP	18	734 48	Coos Bay	43 763	124 1177	Shotcrete over steel and timber sets timber sets and lagging N & S portal are 50 ft long concrete barrels	Poor - Good	1,580 ft	1550	0	0°	Timber sets with rotting footblocks, offsets cracks in shotcrete
CORP	19	745 62	Coos Bay	43 6473	124 1006	Shotcrete over bedrock, shotcrete over steel sets S portal 50 ft concrete barrel	Fair - Good	4,202 ft	Middle 3957	North & South 227	N 6° S 3°	Landslides over both portals, shotcrete thin and cracking bedrock exposed
CORP	20	750 1	Coos Bay	43 5968	124 1493	Shotcrete over bedrock, shotcrete over steel sets, S portal 50 ft concrete barrel	Fair	874 ft	0	870	2°	Large areas of spalling shotcrete with exposed bedrock
CORP	21	751 2	Coos Bay	43 5831	124 1595	Shotcrete over bedrock, N & S portal are 50 ft long concrete barrels	Good	478 ft	0	475	4°	

Note Only Tunnels 13, 15, 17, and 18 were revisited for this review

Total Length 14,077 ft

ODOT RAIL STUDY
TUNNEL 13
Coos Bay Subdivision, Oregon
MP 669.47 to 669.94

Station		Length, ft	Repair Level	Lining		Concrete Curb		Comments	Repairs	Steel Sets		Rockbolts		Shotcrete		Concrete		Timber Sets		Comments
From	To			Type	Set Spacing, ft	Y/N	Above TOR, in			ft	No	Rows	LF	ft²	cy	ft²	cy	ft	No	9/12/08 Visit
0+00	0+00	0	[redacted]	Concrete Portal				North Portal @ MP 669 47												
0+00	0+65	65	[redacted]	Concrete Barrel				Concrete lined ditch approx 2' below TOR												
0+65	1+02	37	[redacted]	Shotcrete over Steel Sets	2	Y	0	Shotcrete over steel sets at 2'-spacing shotcrete is 4"-8" thick, Concrete lined ditch extends 2' below TOR												
1+02	3+60	258	[redacted]	Shotcrete over Steel Sets	4	Y	0	Shotcrete over steel sets at 2'-spacing shotcrete is flush with steel sets (~8" 10" thick), Timber lagging likely still in place, Concrete lined ditch extends 2' below TOR, Several drip locations, heavy drip from west spring line at Sta 2+80												
3+60	4+17	57	[redacted]	Shotcrete over Steel Sets	2	Y	0	Shotcrete over steel sets at 4'-spacing shotcrete is 6"-10" thick, Concrete lined ditch extends 2' below TOR												
4+17	4+34	17	[redacted]	Steel Sets	4	Y	0	Steel sets at 4'-spacing used as jump sets, timber lagging still in place coarse wire mesh was installed between sets (set up for shotcrete application), Bedrock 0 5' - 2 5' behind lagging Concrete lined ditch 2' below TOR												
4+34	4+40	6	[redacted]	Unlined		Y	0	Exposed bedrock. Fault with 2"-offset across tunnel at Sta 4+39	- Install rockbolts (row-spacing 5 feet, five 12'-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete			1	60	432	5					
4+40	6+18	178	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	4	Y	0	Timber sets at 4'-spacing on concrete curb with timber lagging Bottoms of two timber sets are rotted at Sta 5+95 shifted on top of concrete curb Bedrock 2' - 3 5' behind lagging, bedrock appears massive with healed joints, limey appearance, Concrete lined ditch 2' below TOR, ditch ends at Sta 6+18, Concrete curb ends at Sta 6+18	*(Current conditions of timber lining and wood foot blocks are fair to good generally However, timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row-spacing 5 feet five 12'-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete)*											
6+18	6+35	17	[redacted]	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging, Dry												
6+35	6+48	13	[redacted]	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4 -spacing on wood foot blocks with timber lagging Deteriorated lagging along east wall, wood foot blocks in fair condition generally (no cracks or squeezing) Dry												
6+48	7+35	87	[redacted]	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4 -spacing on wood foot blocks with timber lagging foot blocks in fair condition, Dry, - End of curve at ~Sta 7+00												
7+35	8+15	80	[redacted]	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging two foot blocks underneath post typically in fair condition Dry - 3" sag along east sidewall between Sta 7+84 and 7+96												
8+15	8+86	71	[redacted]	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging one foot block underneath post typically foot blocks show advanced deterioration, - 1" sag at Sta 8+45	Replace wood foot blocks with shotcrete footings OR Remove timber lining install rockbolts (row-spacing 5 feet, five 12'-long rockbolts per row), and apply 4"-thick steel fiber reinforced shotcrete			14	840	5112	64			71	19	
8+86	9+92	106	3	Unlined		N		Exposed bedrock consists of sandstone with siltstone interbeds, Section is dry in general, Section is roughly 24 feet wide and 25 feet high - RQD is 90-100 (est) - Joint spacing 3'-6' 3 to 5 joint sets + random sets surface roughness is rough to smooth unfavorable joints direction Medium-high to High-strength rock (75-150 MPa) (est). - Rock Mass Rating (RMR) ~85 (est), Rock Class I-II, - Large portions of the crown consist of one bedding plane - Vertical fault across section between Sta 9+04 on the east wall and Sta 9+59 on the west wall ~ 2' of offset RQD ~50-60 around fault - Rock debris in ditch along both sidewalls are evidence for occasional rockf	- Install rockbolts (row-spacing 5 feet five 12'-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete			21	1260	8480	106					1/2 cy new rock fall in ditches
9+92	12+74	282	[redacted]	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4 -spacing on wood foot blocks with timber lagging in fair condition. Dry, Bedrock consists of sandstone commonly limey appearance	*(Current conditions of timber lining and wood foot blocks are fair to good generally However, timber will deteriorate over time and may cause problems in those sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row-spacing 5 feet five 12'-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete)*											
12+74	13+93	119	3 - 4	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging - 1"-2"-sag along west sidewall between Sta 12+82 and 13+24 locally rotted, squeezed foot blocks, bottom of timber posts also deteriorated locally - 2"-sag along west sidewall between Sta 13+24 and 13+35 - 2 5"-sag along west sidewall between Sta 3+55 and 13+64	- Remove timber lining install rockbolts (row-spacing 5 feet. five 12'-long rockbolts per row), and apply 4"-thick steel fiber reinforced shotcrete			24	1440	8568	158			119	31	
13+93	14+19	26	2 - 3	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging 6"-sag Rotted foot blocks and deteriorated bottoms of posts, timber lagging is falling out and rotted away locally, Exposed bedrock appears to be competent, no significant overbreak throughout section	- Remove timber lining, install rockbolts (row-spacing 5 feet, five 12'-long rockbolts per row), and apply 4"-thick steel fiber reinforced shotcrete			5	300	1872	34			26	8	5 ribs kicked in ~6 in, dropped 12" on east side
14+19	14+83	64	[redacted]	Shotcrete over Steel Sets	2	Y	0	Shotcreted steel sets at 2'-spacing on concrete curb Shotcrete application is 6"-10" thick, Shotcrete was placed over existing timber lagging 4'-5' wide void space between bedrock and shotcreted sets along east sidewall and in the crown, 2'-wide void space between bedrock and shotcreted sets along west sidewall	*Backfill void space behind lagging with cementitious material (Void space average 3'-wide)*											

ODOT RAIL STUDY
TUNNEL 13
Coos Bay Subdivision, Oregon
MP 669.47 to 669.94

Station		Length, ft	Repair Level	Lining		Concrete Curb		Comments	Repairs	Steel Sets		Rockbolts		Shotcrete		Concrete		Timber Sets		Comments
From	To			Type	Set Spacing, ft	Y/N	Above TOR, in			ft	No	Rows	LF	ft²	cy	ft²	cy	ft	No	9/12/08 Visit
14+83	14+87	4	2	Unlined		N		Exposed bedrock, Separated rock blocks in crown, obvious rockfall hazard	- Install rockbolts (row-spacing 5 feet six 12'-long rockbolts per row) and apply 6"-thick steel fiber reinforced shotcrete			1	60	288	5					2' block of rock on 1/4 arch
14+87	15+12	25	2-3	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging, Advanced deterioration of wood foot blocks, rotted lagging is falling out, - 4"-5"-sag along east sidewall from Sta 14+93 to 15+12	- Remove timber lining, install rockbolts (row-spacing 5 feet, six 12'-long rockbolts per row), and 6"-thick apply steel fiber reinforced shotcrete			5	360	1800	33			25	7	
15+12	15+20	8	2	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging Rotted and deteriorated timber sets (3) advanced deterioration of wood foot blocks rotted lagging is falling out, Exposed bedrock along east sidewall - 2"-3"-sag along west sidewall from Sta 15+00 to 15+33 (extends into following section - see below)	- Remove timber lining, install rockbolts (row-spacing 5 feet six 15'-long rockbolts per row), and apply 6"-thick steel fiber reinforced shotcrete			2	180	576	10			8	3	
15+20	15+49	29	2	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging Advanced deterioration of wood foot blocks, rotted lagging, Bedrock appears to be competent - 7"-sag from Sta 15+29 to 15+33 and from Sta 15+33 to 15+49 along east sidewall, - 4"-sag from Sta 15+33 to 15+53 along west sidewall (extends into following section - see below)	Remove timber lining install rockbolts (row-spacing 5 feet five 15'-long rockbolts per row) and apply 6"-thick steel fiber reinforced shotcrete			6	450	2088	38			29	8	
15+49	15+69	20	3-4	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging, Rotted lagging, Bedrock appears to be competent,	Remove timber lining install rockbolts (row-spacing 5 feet, six 12'-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete			4	288	1440	18			20	6	
15+69	16+14	45	2	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging - Rotted timber sets and timber lagging along east sidewall between Sta 15+69 and 16+02, bedrock rubble fell through lagging - rockfall hazard, - Deteriorated timber posts and wood foot blocks along west sidewall between Sta 15+69 and 16+14 timber lagging is rotted and falling out	- Remove timber lining, install rockbolts (row-spacing 5 feet six 12'-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete			9	648	3240	40			45	12	
16+14	16+58	44	3-4	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging Deteriorated sets, lagging, and wood foot blocks at various stages - Timber lagging in 1/4-arch rotted - but mostly still in place - along west sidewall between Sta 16+34 and 16+49 deterioration along backside of timber posts, foot blocks in fair condition	- Remove timber lining install rockbolts (row-spacing 5 feet six 12'-long rockbolts per row), and apply 4"-thick steel fiber reinforced shotcrete			9	648	3168	39			44	12	
16+58	16+89	31	3	Timber Sets with Timber Lagging on Wood Foot Blocks	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging Rotted lagging condition of foot blocks fair to very poor throughout section - Drip from crown at Sta 16+82	- Remove timber lining, install rockbolts (row-spacing 5 feet, six 12'-long rockbolts per row), and apply 4"-thick steel fiber reinforced shotcrete			6	432	2232	28			31	9	
16+89	17+08	19	[illegible]	Steel Sets on I-beams and Timber Sets with Timber Lagging	4	N		Steel sets installed between existing timber sets (timber sets at 4'-spacing), wood boards were used to strap section together steel set footings are cut I-beams in-place timber lagging generally dry	- Remove timber sets, wood foot blocks, and timber lagging, clean footings, and apply 4"-thick steel fiber reinforced shotcrete between steel sets Use shotcrete to tie in steel web and for footing support					1368	17					
17+08	18+27	119	[illegible]	Timber Sets with Timber Lagging and Wood Foot Blocks	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging, Sets, lagging, and foot blocks generally in fair condition Apparently competent bedrock close behind lagging typically - Damp lagging between Sta 17+20 to 17+36, - Damp and rotted lagging between Sta 17+61 to 17+69, - Drip at east springline at Sta 17+63 - Drip at west springline at Sta 17+67 - 3'-4'-wide void space between lagging and rock from 3'-4' below east springline to bottom of east sidewall between Sta 17+90 and 18+39	Replace wood foot blocks with shotcrete footings OR - Remove timber lining install rockbolts (row-spacing 5 feet, six 12'-long rockbolts per row), and apply 4"-thick steel fiber reinforced shotcrete			24	1728	8568	107			119	31	
18+27	18+40	13	3	Timber Sets with Timber Lagging on Wood Foot Blocks	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging Rotted lagging and deteriorated posts along west sidewall	- Remove timber lining, install rockbolts (row-spacing 5 feet six 12'-long rockbolts per row), and apply 4"-thick steel fiber reinforced shotcrete			3	216	936	11			13	4	
18+40	18+44	4	2	Unlined				Exposed bedrock with apparent recent rockfall (rock fragments up to 2'x1'x1' size)	- Install rockbolts (row-spacing 5 feet six 12'-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete			1	72	288	3					~1 cy rock and wood debris in ditch
18+44	19+20	76	[illegible]	Shotcrete over Steel Sets	2	Y	0	Shotcrete over steel sets at 2'-spacing on concrete curb Shotcrete application flush with steel sets (~6"-10"-thick), Shotcrete was applied over existing timber lagging	*Backfill void space behind lagging with cementations material (Potentially 2'-wide void space)*											
19+20	19+66	46	[illegible]	Shotcrete over Steel Sets	2	Y	0	Shotcrete over steel sets at 2'-spacing on concrete curb Shotcrete application ~4"-6"-thick Shotcrete was applied over existing timber lagging	*Backfill void space behind lagging with cementations material (Potentially 2'-wide void space)*											
19+66	19+75	9	3	Unlined				Exposed bedrock in fair condition, RQD ~60-70% in east sidewall, ~80-90% in crown, ~70-80% in west sidewall (all est.)	- Install rockbolts (row-spacing 5 feet six 12'-long rockbolts per row), and apply 4"-thick steel fiber reinforced shotcrete			2	144	648	8					~1 cy rock and wood debris in ditch

ODOT RAIL STUDY
TUNNEL 13
Coos Bay Subdivision, Oregon
MP 669.47 to 669.94

Station From	Station To	Length, ft	Repair Level	Lining Type	Lining Set Spacing, ft	Concrete Curb Y/N	Concrete Curb Above TOR, in	Comments	Repairs	Steel Sets ft	Steel Sets No	Rockbolts Rows	Rockbolts LF	Shotcrete ft²	Shotcrete cy	Concrete ft²	Concrete cy	Timber Sets ft.	Timber Sets No	Comments 9/12/08 Visit
19+75	20+25	50		Steel Sets on I-beams	2	N		Steel sets at 2'-spacing on I-beams Wire mesh was installed between sets Timber lagging was left in place Large void space between existing timber lagging and bedrock locally - Drips from crown between Sta 19+80 to 19+98	*(Current conditions of timber lining and wood foot blocks are fair to good generally However, timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row-spacing 5 feet five 12'-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete OR installation of steel channel lagging between steel sets and backfilling void space with cementious material*											
20+25	21+71	146		Shotcrete over Steel Sets	4	Y		Shotcreted steel sets at 4'-spacing, Shotcrete application is flush with steel sets, Shotcrete was placed over existing timber lagging, Shotcrete or concrete footing throughout section	*Backfill void space behind lagging with cementations material (Potentially 2'-wide void space)*											
21+71	22+97	126		Steel Sets on I-beams	2	N		Steel sets at 2'-spacing on I-beams, Existing timber lagging was left in place Styrofoam was used to backfill large void space between lagging and bedrock - Drip from west springline at Sta 22+57	*(Current conditions of timber lining and wood foot blocks are fair to good generally However timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row-spacing 5 feet five 12'-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete OR installation of steel channel lagging between steel sets and backfilling void space with cementious material*											
22+97	23+23	26	2	Steel Sets on I-beams	4	N		Steel sets at 4'-spacing on I-beams , Existing timber lagging was left in place, timber lagging is rotted and falling into tunnel Rock debris collected behind lagging Occasional rock fall is evident (see below) - Rockfall material and rotted lagging on tracks along east sidewall from Sta 22+97 to 23+23	Remove timber lagging and all loose debris behind lagging - Apply 6" thick steel fiber reinforced shotcrete between steel sets, Use shotcrete to be in steel web and for footing support OR Install steel channel lagging between steel sets and backfill void space with cementuous material					1872	48					
23+23	23+39	16	3 - 4	Steel Sets on I-beams	4	N		Steel sets at 4'-spacing founded on I-beams Existing timber lagging was left in place, Timber lagging rotted in places	Remove timber lagging and all loose debris behind lagging - Apply 6"-thick steel fiber reinforced shotcrete between steel sets, Use shotcrete to tie in steel web and for footing support OR Install steel channel lagging between steel sets and backfill void space with cementuous material					1152	29					
23+39	23+53	14	2	Steel Sets on I-beams	4	N		Steel sets at 4'-spacing founded on I-beams Existing timber lagging was left in place timber lagging is rotted and falling into tunnel Rock debris collected behind lagging, Rockfall material and rotted lagging on tracks along east sidewall	Remove timber lagging and all loose debris behind lagging - Apply 6"-thick steel fiber reinforced shotcrete between steel sets Use shotcrete to tie in steel web and for footing support OR Install steel channel lagging between steel sets and backfill void space with cementuous material					1008	26					
23+53	23+95	42	3 - 4	Steel Sets on I-beams	4	N		Steel sets at 4'-spacing founded on I-beams , Existing timber lagging was left in place, timber lagging is rotted and ready to fall into tunnel, Bedrock appears to be close behind lagging along east sidewall, Generally 3' to 4' of void space behind lagging in crown, Damp to wet with drips	Remove timber lagging and all loose debris behind lagging - Apply 6"-thickstool fiber reinforced shotcrete between steel sets, Use shotcrete to be in steel web and for footing support OR Install steel channel lagging between steel sets and backfill void space with cementuous material					3024	224					
23+95	24+31	36	2	Steel Sets on I-beams	4	N		Steel sets at 4'-spacing founded on I-beams Existing timber lagging was left in place rotted timber lagging with bedrock debris behind, - Day-lighted section in crown between ~Sta 24+20 and 24+31, flowing water from crown	Remove timber lagging and all loose debris behind lagging - Apply 6"-thick steel fiber reinforced shotcrete between steel sets Use shotcrete to tie in steel web and for footing support OR Install steel channel lagging between steel sets and backfill void space with cementuous material					2592	192					

ODOT RAIL STUDY
TUNNEL 13
Coos Bay Subdivision, Oregon
MP 669.47 to 669.94

Station From	Station To	Length, ft	Repair Level	Lining Type	Lining Set Spacing, ft	Concrete Curb Y/N	Concrete Curb Above TOR, in	Comments	Repairs	Steel Sets ft	Steel Sets No	Rockbolts Rows	Rockbolts LF	Shotcrete ft²	Shotcrete cy	Concrete ft²	Concrete cy	Timber Sets ft	Timber Sets No	Comments 9/12/08 Visit
24+31	24+96	65		Concrete Barrel				Concrete barrel - Crack across barrel at Sta 24+71 with some spalling and water seepage along crack												
24+96	24+96	0		Concrete Portal				South Portal @ MP 669.94												
									Total	0	0	137	9126	60752	1243	0	0	550	150	

Total Length (ft)	2496
Repair Level 2 (ft)	166
Repair Level 2-3 (ft)	51
Repair Level 3 (ft)	159
Repair Level 3-4 (ft)	241
Repair Level 4 (ft)	138
Repair Level 4-5 (ft)	77
Repair Level 5 (ft)	1664

Repair Level

1	Repairs should be completed immediately to <6 months
2	Repairs should be completed in 0 to 12 months
3	Repairs should be completed in 12 - 30 months
4	Repairs should be completed in 30 - 48 months
5	No immediate repairs required based on the current conditions

COST ESTIMATE FOR REPAIR LEVELS 1 AND 2 (incl Level 2-3)

Est Total Steel Sets (No)	0	(Est Unit Rates $5300/per set)	Est Total Construction Costs	$0
Est Total Rockbolts (LF)	2070	(Est Unit Rates $85/per LF)	Est Total Construction Costs	$175 950
Est Total Concrete (cy)	0	(Est Unit Rates $110/per CY)	Est Total Construction Costs	$0
Est Total Shotcrete (cy)	429	(Est Unit Rates $1000/per CY)	Est Total Construction Costs	$429,000
Est Total Timber Sets (No)	38	(Est Removal Unit Rate $1600/per set)	Est Total Removal Costs	$60,800
			Est Sub Total for Level 1and 2 (incl Level 2-3) Repairs	$665,750
			Mobilization (15%)	$99,863
			Contingency (20%)	$133,150
			Est Total of Level 1and 2 (incl Level 2-3) Construction Cost	$898,763

COST ESTIMATE FOR REPAIR LEVELS 1 TO 5

Est Total Steel Sets (No)	0	(Est Unit Rates $5300/per set)	Est Total Construction Costs	$0
Est Total Rockbolts (LF)	9126	(Est Unit Rates $85/per LF)	Est Total Construction Costs	$775,710
Est Total Concrete (cy)	0	(Est Unit Rates $110/per CY)	Est Total Construction Costs	$0
Est Total Shotcrete (cy)	1243	(Est Unit Rates $1000/per CY)	Est Total Construction Costs	$1,243,000
Est Total Timber Sets (No)	150	(Est Removal Unit Rate $1600/per set)	Est Total Removal Costs	$239,200
			Est Sub Total for Repairs	$2 257 910
			Mobilization (15%)	$338 687
			Contingency (20%)	$451 582
			Est Total of Construction Cost	$3,048,179

ODOT TUNNEL REVIEW
TUNNEL 14
Coos Bay Subdivision, Oregon
MP 681.09 to 681.18

Station		Length, ft	Repair Level	Lining		Concrete Curb		Comments	Repairs	Steel Sets		Rockbolts		Shotcrete		Concrete		Timber Sets	
From	To			Type	Set Spacing, ft	Y/N	Above TOR, In			ft	No	Rows	LF	ft²	cy	ft²	cy	ft.	No
0+00	0+00	0		Concrete Portal		N		North Portal @ MP 681 09											
0+00	0+50	50		Concrete Barrel		N		In general dry Spalling concrete in east sidewall at Sta 0+24											
0+50	0+90	40		Shotcrete over Bedrock		N		Shotcrete cover over bedrock generally in good condition, Shotcrete is relatively thin in crown (<1") and not reinforced											
0+90	1+90	100		Shotcrete over Bedrock		N		Shotcrete cover over bedrock very thin in crown (0 5" to 1") and not reinforced, thickness in sidewalls estimated to be around 2", Large areas with spalling shotcrete in crown Crown is built up by one bedding plane	Cover spalling areas with steel fiber reinforced shotcrete to desired thickness of 4 inches, new application shall extend to the bottom of sidewalls (2"-thick over existing shotcrete)					7200	66				
1+90	4+51	261		Shotcrete over Bedrock		N		Shotcrete cover over bedrock generally in good condition, Shotcrete is relatively thin in crown (<1") and not reinforced											
4+51	4+71	20		Shotcrete over Steel Sets	2 and 4	Y	-3	Shotcrete over steel sets at 4'-spacing on concrete curb relatively thin shotcrete cover (2"-4") Top of concrete curb is 2 to 3 inches below TOR, Last three steel sets at South Portal are at a 2'-spacing											
4+71	4+71	0		Shotcrete over Steel Sets	2	Y	-3	South Portal @ MP 681 18											
Total Length (ft)		471							Total	0	0	0	0	7200	66	0	0	0	0
Repair Level 4-5 (ft)		100																	
Repair Level 5 (ft)		371																	

Repair Level

	Repairs should be completed immediately to <6 months
2	Repairs should be completed in 0 to 12 months
3	Repairs should be completed in 12 - 30 months
	Repairs should be completed in 30 - 48 months
	No immediate repairs required based on the current conditions

COST ESTIMATE FOR REPAIR LEVELS 1 TO 5

Est Total Steel Sets (No)	0	(Est Unit Rates $5300/per set)	Est Total Construction Costs	$0
Est Total Rockbolts (LF)	0	(Est Unit Rates $85/per LF)	Est Total Construction Costs	$0
Est Total Concrete (cy)	0	(Est Unit Rates $110/per CY)	Est Total Construction Costs	$0
Est Total Shotcrete (cy)	66	(Est Unit Rates $1000/per CY)	Est Total Construction Costs	$66,000
Est Total Timber Sets (No)	0	(Est Removal Unit Rate $1500/per set)	Est Total Removal Costs	$0

Est Sub Total for Repairs $66,000
Mobilization (15%) $9 900
Contingency (20%) $13,200
Est Total of Construction Cost $89,100

ODOT RAIL STUDY
TUNNEL 15
Coos Bay Subdivision, Oregon
MP 720.73 to 720.14

Station From	Station To	Length, ft	Repair Level	Lining Type	Lining Set Spacing, ft	Concrete Curb Y/N	Concrete Curb Height above TOR, in	Comments	Repairs	Steel Sets ft	Steel Sets No	Rockbolts Rows	Rockbolts LF	Shotcrete ft²	Shotcrete cy	Concrete ft²	Concrete cy	Timber Sets ft.	Timber Sets No	Comments 9/12/06 Visit
00+00	00+00	0	[redacted]	Concrete Portal				North Portal @ MP 720.73										-		
00+00	00+26	26	[redacted]	Concrete Barrel				Concrete Barrel										-		
00+26	01+35	109	[redacted]	Shotcrete over Steel Sets on Concrete Curb	4 0	Y	6	Steel sets covered with shotcrete, spaced 4 ft. concrete between sets (?)												
01+35	01+47	12	[redacted]	Shotcrete over Steel (and Timber?) Sets on Concrete Curb	N/A	Y	6	Steel (and timber?) sets covered with shotcrete												
01+47	02+10	63	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	1 5	Y	6	Wood ribs spaced 1 5 ft, fair condition, wet slight deterioration	Remove timber sets and lagging and install rockbolts in crown and sidewalls (row-spacing 5 feet six 14-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete			12	1008	4538	57			63	43	
02+10	02+15	5	3	Timber Sets on Concrete Curb with Timber Lagging	1 5	Y	6	3 timber sets, offset crushed and cracked joints	Remove timber sets and lagging and install rockbolts in crown and sidewalls (row spacing 5 feet, six 14 long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete			1	84	360	4			5	4	
02+15	02+77	62	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	1 0 2 0	Y	6	Wood ribs spaced 1-2 ft fair to good condition, dry	Remove timber sets and lagging and install rockbolts in crown and sidewalls (row spacing 5 feet, six 14' long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete			12	1008	4484	56			62	42	
02+77	02+93	16	3	Timber Sets on Concrete Curb with Timber Lagging	2 0	Y	6	Deteriorated wood sets, wet - heavy dripping	Remove timber sets and lagging and install rockbolts in crown and sidewalls (row spacing 5 feet, ten 14'-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete			3	420	1152	14			16	9	
02+93	03+08	13	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	2 0	Y	6	Timber sets in fair condition, dry	*(Current conditions of timber lining are fair to good generally However timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row-spacing 5 feet, six 12-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete)*											
03+08	03+20	14	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	1 0-2 0	Y	6	Rotting timber sets, sp 1-2 ft, sheared offset joints, dry in general	Remove timber sets and lagging and install rockbolts in crown and sidewalls (row-spacing 5 feet, ten 14-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete			3	420	1008	12			14	10	
03+20	03+32	12	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	1 0-2 0	Y	6	Rotting timber sets, sp 1-2 ft, sheared, offset joints, wet - a timber set fell into the tunnel on 07/05/2007 at approximately Sta 3+28	Remove timber sets and lagging and install rockbolts in crown and sidewalls (row spacing 5 feet, ten 14' long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete			2	280	864	10			12	9	
03+32	03+56	24	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	1 5	Y	6	Rotting timber sets spaced 1 5 ft dry in general - the east ½ arch segment of the timber set located at around Sta 3+43 fell into the tunnel on 01/18/2007	Remove timber sets and lagging and install rockbolts in crown and sidewalls (row-spacing 5 feet ten 14-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete			5	700	1728	21			24	17	
03+56	03+72	16	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	1 0	Y	6	Rotting timber sets, spaced 1 ft., heavy dripping	Remove timber sets and lagging and install rockbolts (row-spacing 5 feet, ten to twelve 15'-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete. The construction of the new liner may require the use of steel sets for temporary and permanent support also, due to the wet condition of the area backfilling of the area with concrete or shotcrete maybe required instead of applying shotcrete Prior to construction, the drilling of probe holes maybe required in order to obtain information about the current general ground condition	20	6	4	600	1440	18			16	17	
03+72	03+86	14	3	Timber Sets on Concrete Curb with Timber Lagging	1 5	Y	6	Rotting timber posts along west side, spaced 1 5 ft	Remove timber sets and lagging and install rockbolts (row-spacing 5 feet six 14-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete			3	210	1008	12			14	10	
03+86	04+15	29	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	1 5-2 0	Y	6	Wood ribs fair condition - Timber sets were shotcreted during repairs in November 2006, Rockbolts were installed in crown and sidewalls north of caved in/collapsed area	*Section may require more shotcrete between the existing timber sets for completion - or remove current lining and replace with additional rockbolts and a 4" thick application of shotcrete*											
04+15	04+42	27	[redacted]	Steel Arches on Steel and Timber Posts, Shotcreted and Backfilled	4 0	Y	6	Wood ribs w/ steel straps - 3 full steel sets (4' spacing) were installed after a cave in/collapse occurred in the west sidewall in November 2006, remaining section consist of arch segments only (placed on a wall plate supported by in-place timber posts) Low-strength concrete was used to backfill area between and behind steel sets. Rockbolts and/or Spiling were installed through out the section												

ODOT RAIL STUDY
TUNNEL 15
Coos Bay Subdivision, Oregon
MP 720.73 to 720.14

Station		Length, ft	Repair Level	Lining		Concrete Curb		Comments	Repairs	Steel Sets		Rockbolts		Shotcrete		Concrete		Timber Sets		Comments
From	To			Type	Set Spacing, ft	Y/N	Height above TOR, in			ft	No	Rows	LF	ft²	cy	ft²	cy	ft	No	9/12/08 Visit
04+42	04+60	18	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	4 0	Y	6	Wood ribs with longitudinal cracks in several timbers - Timber sets were shotcreted during repairs in November 2006, Rockbolts were installed in crown and sidewalls	*Section may require more shotcrete between the existing timber sets for completion or remove current lining and replace with a 4" thick application of shotcrete*											
04+60	04+79	19	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	2 0	Y	6	"Tight" timber sets nummerous offsets, poor condition - Timber sets were partially shotcreted in sidewalls during repairs in November 2006 Rockbolts were installed in crown during repairs	*Section may require more shotcrete between the existing timber sets for completion - or remove current lining and replace with additional rockbolts and a 4" thick application of shotcrete*											
04+79	04+86	7	[redacted]	Shotcrete over Steel Sets on Concrete Curb	4 0	Y	6	Caved area up ~15 ft (est: 10 to 15 cy of rock fall material) - Section was stabilized in November 2006 with two steel sets spaced at 4 feet steel channel lagging was installed and arches and crown were backfilled with shotcrete												
04+86	05+12	26	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	1 5	Y	6	Rotted timber and crushed butt joints Bowed sets along east sidewall were reinforced with rockbolts recently	Remove timber lining install rockbolts (row-spacing 5 feet eight to ten - two rockbolts in each sidewall - 12'-long rockbolts per row), and apply 4"-thick steel fiber reinforced shotcrete			5	600	1872	23			26	18	
05+12	05+29	17	[redacted]	Steel Sets on Concrete Curb	1 5	Y	6	Steel sets, spaced 1 5 ft	*For long-term stability remove timber lagging behind steel sets and apply 4"-thick shotcrete over exposed ground between sets*					1224	15					
05+29	05+74	45	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	1 5	Y	6	Timber sets, spaced 1 5ft., with polyurethane grout Sandstone exposed in 1/4 arch	*Current condition of timber lining is fair to good generally However timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row-spacing 5 feet, six 12'-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete*											
05+74	05+78	4	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	2 0	Y	6	Rotted timber and crushed butt joints,	*Two timber sets were left in place, because they appeared to be tight when attempted to be removed during recent repair works However timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row-spacing 5 feet, five 12'-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete*											
05+78	05+85	7	[redacted]	Shotcrete over bedrock		Y	6	Timber sets were removed and replaced with shotcrete and rockbolts												
05+85	05+92	7	[redacted]	Shotcrete over bedrock		Y	6	Timber sets were removed and replaced with shotcrete and rockbolts												
05+92	06+18	26	3	Timber Sets on Concrete Curb with Timber Lagging	1 5-2 0	Y	6	Rotted timber and crushed butt joints, thin steel starps in arch, hanging segments	Remove timber lining, install rockbolts (row-spacing 5 feet, ten - two in each sidewall - 12'-long rockbolts per row), and apply 4" thick steel fiber reinforced shotcrete			5	600	1872	23			26	18	
06+18	08+89	271	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	2 0	Y	6	Good wood sets dry spaced 2 ft	*Current conditions of timber lining is fair to good generally However timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row-spacing 5 feet five 12'-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete*											
08+89	09+26	37	[redacted]	Steel Sets and Timber Sets on Concrete Curb with Timber Lagging	1 0-1 5	Y	6	Steel jump sets timber sets, wet area at Sta 12+50 - one split set hanging down in arch	Remove timber sets and timber lagging between steel jump sets, place 4"-thick shotcrete over exposed ground and tie steel sets into shotcrete application					2664	33			37	20	
09+26	09+88	62	[redacted]	Shotcrete over Steel Sets on Concrete Curb	2 0	Y	6	Steel sets covered with shotcrete minor drips scattered missing shotcrete in arch												
09+88	11+10	122	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	2 0	Y	6	Wood ribs sp 2 ft, good condition dry sand deposits at toe of posts at Sta 11+25	*Current conditions of timber lining is fair to good generally However timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row-spacing 5 feet five 12 -long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete*			24	1728	8784	110			122	62	~10 % of wood footing blocks are rotted & crushed - west side - downgraded to Repair Level 4
11+10	12+66	156	[redacted]	Shotcrete over Steel Sets on Concrete Curb	2 0	Y	6	Steel ribs spaced 2 ft covered with shotcrete dry												

ODOT RAIL STUDY
TUNNEL 15
Coos Bay Subdivision, Oregon
MP 720.73 to 720.14

Station From	Station To	Length, ft	Repair Level	Lining Type	Lining Set Spacing, ft	Concrete Curb Y/N	Concrete Curb Height above TOR, in	Comments	Repairs	Steel Sets ft	Steel Sets No	Rockbolts Rows	Rockbolts LF	Shotcrete ft²	Shotcrete cy	Concrete ft²	Concrete cy	Timber Sets ft	Timber Sets No	Comments 9/12/08 Visit
12+66	13+28	62		Timber Sets on Concrete Curb with Timber Lagging	2 0	Y	6	Good wood sets dry spaced 2 ft	*Current conditions of timber lining is fair to good generally However timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row spacing 5 feet, five 12-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete*											
13+28	13+90	62		Shotcrete over Steel Sets on Concrete Curb	2 0	Y	6	Steel ribs spaced 2 ft, covered with shotcrete dry												
13+90	14+34	44		Timber Sets on Concrete Curb with Timber Lagging	2 0	Y	6	Good wood sets dry, spaced 2 ft	*Current conditions of timber lining is fair to good generally However, timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row-spacing 5 feet five 12-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete*											
14+34	14+47	13	3	Steel Sets and Timber Sets on Concrete Curb with Timber Lagging	10-1 5	Y	6	Steel jump sets poor wood sets, lost 2 sections Another timber set fell out on 11/17/2006 at approximately Sta 14+41	Remove timber sets and timber lagging between steel jump sets place 4"-thick shotcrete over exposed ground and tie steel sets into shotcrete application					936	11			13	5	
14+47	15+65	118		Timber Sets on Concrete Curb with Timber Lagging	2 0	Y	6	Good wood sets dry, spaced 2 ft	*Current conditions of timber lining is fair to good generally However timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row spacing 5 feet five 12"-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete*	1		24	1440	8496	106			118	60	Lower 6" - 24" of several timber ribs are wet and rotting - downgraded to Repair Level 4
15+65	16+61	96		Shotcrete over Steel (and Timber) Sets	1 0	Y	6	Steel- and (possibly) wood ribs, spaced 1 ft, covered with shotcrete												
16+61	18+95	234		Shotcrete over Steel Sets on Concrete Curb	2 0	Y	6	Steel ribs spaced 2 ft covered with shotcrete local drips scattered missing shotcrete in arch	Repair spalled shotcrete in crown and increase general thickness of shotcrete in crown (around 2 inches)					6318	58					
18+95	20+60	165		Shotcrete over Steel Sets on Concrete Curb	1 5 2 0	Y	6	Steel ribs spaced 1 5 to 2 ft covered with shotcrete abundant drips, missing shotcrete in arch locally	Repair spalled shotcrete in crown and increase general thickness of shotcrete in crown (around 2 inches)					4455	41					1/4 cy rock fall through hole in arch at 19+80
20+60	21+43	83		Concrete Barrel		N		Concrete Barrel longitudinal cracks in both sides some displacement along cracks	Support sidewalls of concrete barrel with rockbolts, 1 2 rows on each side at a 5' spacing, bolt length estimated to be 12 feet minimum Initial work may require probe holes to determine thickness of concrete and depth to competent bedrock			4	816							
21+43	21+43	0		S Portal		N		South Portal @ MP 721 14												
Total Length (ft.)		2143							Total	20	6	107	9914	53181	624	0	0	568	345 5	
Repair Level 1-2 (ft.)		12																		
Repair Level 2 (ft.)		80																		
Repair Level 3 (ft.)		74																		
Repair Level 4 (ft.)		607																		
Repair Level 4 5 (ft.)		66																		
Repair Level 5 (ft.)		1304																		

Repair Level

	Repairs should be completed immediately to <6 months
2	Repairs should be completed in 0 to 12 months
3	Repairs should be completed in 12 - 30 months
	Repairs should be completed in 30 - 48 months
	No immediate repairs required based on the current conditions

COST ESTIMATE FOR REPAIR LEVELS 1 to 2

Est Total Steel Sets (No)	6	(Est Unit Rates $5300/per set)	Est Total Construction Costs	$31,800
Est Total Rockbolts (LF)	2600	(Est Unit Rates $85/per LF)	Est Total Construction Costs	$221 000
Est Total Concrete (cy)	0	(Est Unit Rates $110/per CY)	Est Total Construction Costs	$0
Est Total Shotcrete (cy)	84	(Est Unit Rates $1000/per CY)	Est Total Construction Costs	$84,000
Est Total Timber Sets (No)	72	(Est Removal Unit Rate $1600/per set)	Est Total Removal Costs	$114 667

Est Sub Total for Level 1and 2 (incl Level 2-3) Repairs $451,467
Mobilization (15%) $67 720
Contingency (20%) $90,293
Est Total of Level 1and 2 (incl Level 2-3) Construction Cost $609,480

COST ESTIMATE FOR REPAIR LEVELS 1 TO 5

Est Total Steel Sets (No)	6	(Est Unit Rates $5300/per set)	Est Total Construction Costs	$31,800
Est Total Rockbolts (LF)	9914	(Est Unit Rates $85/per LF)	Est Total Construction Costs	$842 690
Est Total Concrete (cy)	0	(Est Unit Rates $110/per CY)	Est Total Construction Costs	$0
Est Total Shotcrete (cy)	624	(Est Unit Rates $1000/per CY)	Est Total Construction Costs	$624 000
Est Total Timber Sets (No)	348	(Est Removal Unit Rate $1600/per set)	Est Total Removal Costs	$552 800

Est Sub Total for Repairs $2,051 290
Mobilization (15%) $307,694
Contingency (20%) $410,258
Est Total of Construction Cost $2 769,242

ODOT RAIL STUDY
TUNNEL 16
Coos Bay Subdivision, Oregon
MP 721.52 to 721.64

Station		Length, ft	Repair Level	Lining		Concrete Curb		Comments	Repairs	Steel Sets		Rockbolts		Shotcrete		Concrete		Timber Sets	
From	To			Type	Set Spacing, ft	Y/N	Height above TOR, in			ft	No	Rows	LF	ft²	cy	ft²	cy	ft	No
0+00	0+00	0		Concrete Portal				North Portal @ MP 721 52											
0+00	0+55	55		Concrete Barrel				Concrete barrel Scattered cracks in barrel crown Scattered drips in crown - ⅛"-¼" open crack on east sidewall and ½" open crack on west wall at Sta 0+10 - Horizontal crack along west sidewall from Sta 0+11 to 0+55, offset in places up to ½", - Horizontal crack ¼" open along east sidewall from 0+11 to 0+55 other											
0+55	4+10	355		Shotcrete over Steel Sets	2 5	Y	6	Shotcrete over steel sets at 2 5'-spacing on concrete curb, - Drips near center line of crown between Sta 1+21 and 1+33 - Damp with discoloration along center line of crown at Sta 3+53 and at Sta 3+83 - Damp spot on west side of crown at Sta 4+00											
4+10	4+43	33		Shotcrete over Steel Sets	2 5	Y	6	Seepage in crown with dripping locally and orange discoloration											
4+43	4+56	13		Shotcrete over Steel Sets	2 5	Y	6	Dry											
4+56	4+86	30		Shotcrete over Steel Sets	2 5	Y	6	Seepage in crown with dripping locally and white to orange discoloration											
4+86	5+00	14		Shotcrete over Steel Sets	2 5	Y	6	Dry Orange discoloration											
5+00	5+52	52		Shotcrete over Steel Sets	2 5	Y	6	Intermittent cracking in shotcrete application along center line of crown - Seepage at west springline at Sta 5+04 - Heavy dripping and discoloration at Sta 5+11,											
5+52	5+78	26		Shotcrete over Steel Sets	2 5	Y	6	Heavy dripping along west springline between Sta 5+52 and 5+57, Flowing water at contact of steel sets and concrete barrel											
5+78	6+33	55		Concrete Barrel				Concrete barrel Damp with local dripping - Flowing water above springline in west sidewall at Sta 5+84 and 5+92,											
6+33	6+33	0		Concrete Portal				South Portal @ MP 721 64											
Total Length (ft)		633							Total	0	0	0	0	0	0	0	0	0	0
Repair Level 5 (ft)		633																	

Repair Level

	Repairs should be completed immediately to <6 months
2	Repairs should be completed in 0 to 12 months
3	Repairs should be completed in 12 - 30 months
	Repairs should be completed in 30 - 48 months
	No immediate repairs required based on the current conditions

COST ESTIMATE FOR REPAIR LEVELS 1 TO 5

Est Total Steel Sets (No)	0	(Est Unit Rates $5300/per set)	Est Total Construction Costs	$0
Est Total Rockbolts (LF)	0	(Est Unit Rates $85/per LF)	Est Total Construction Costs	$0
Est Total Concrete (cy)	0	(Est Unit Rates $110/per CY)	Est Total Construction Costs	$0
Est Total Shotcrete (cy)	0	(Est Unit Rates $1000/per CY)	Est Total Construction Costs	$0
Est Total Timber Sets (No)	0	(Est Removal Unit Rate $1600/per set)	Est Total Removal Costs	$0

Est Sub Total for Repairs $0
Mobilization (15%) $0
Contingency (20%) $0
Est Total of Construction Cost $0

ODOT RAIL STUDY
TUNNEL 17
Coos Bay Subdivision, Oregon
MP 727.70 to 727.83

Station		Length, ft	Repair Level	Lining		Concrete Curb		Comments	Repairs	Steel Sets		Rockbolts		Shotcrete		Concrete		Timber Sets		Comments
From	To			Type	Set Spacing, ft	Y/N	Height above TOR, in			ft	No	Rows	LF	ft^2	cy	ft^2	cy	ft	No	9/13/08 Visit
0+00	0+00	0	[redacted]	Concrete Portal				North Portal @ MP 727 70												
0+00	1+28	128	[redacted]	Concrete Barrel				Concrete barrel - Damp from Sta 0+25 to 1+28 - Crack in E-sidewall at Sta 0+52, - Crack in W-sidewall at Sta 0+57, - Crack at center line of crown from ~Sta 0+72 to 1+28, - Ditches along both sides are filled with silt and gravel depth ditches appear to be at least 18" below rail												v muddy ballast Sta 0+00 to 2+50
1+28	1+43	15	[redacted]	Shotcrete over Steel Sets	1-1.5	Y	6	Shotcrete over steel sets at narrow spacing on concrete curb, Application is relatively thin (~4"-thick) Existing timber lagging was covered with shotcrete possibly Track is sunk in mud - Flowing water from ¼-arch on E-sidewall (est 5-10 gal/min) at Sta 1+39												
1+43	2+45	102	[redacted]	Shotcrete over Steel Sets	2	Y	6	Shotcrete over steel sets at 2'- spacing on concrete curb, Thickness of application is between 3" and 8", thinner in crown generally, Abundant drips, shotcrete is discolored at many locations tunnel dries up around Sta 2+30 generally, Very muddy track												
2+45	3+39	94	[redacted]	Shotcrete over Steel Sets	4	Y	6	Shotcrete over steel sets at 4'- spacing on concrete curb, Thickness of application is between 4" and 6", thinner in crown generally, Scattered drips, shotcrete is discolored in many locations Track dries up and ballast starts to become visible between Sta 2+50 and 2+60												
3+39	3+65	26	[redacted]	Shotcrete over Steel Sets	2	Y	6	Shotcrete over steel sets at 2'- spacing on concrete curb, Thickness of application is between 4" and 6", thinner in crown generally,												
3+65	4+29	64	[redacted]	Shotcrete over Steel Sets	4	Y	6	Shotcrete over steel sets at 4'- spacing on concrete curb, Thickness of application is between 4" and 6", thinner in crown generally, Dry												
4+29	4+52	23	[redacted]	Shotcrete over Steel Sets	2	Y	6	Shotcrete over steel sets at 2'- spacing on concrete curb, Thickness of application is between 4" and 6", thinner in crown generally												
4+52	4+60	8	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	4	Y	6	Timber sets at 4'-spacing on concrete curb with timber lagging Dry	(Current conditions of timber lining and wood foot blocks are fair to good generally However timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row-spacing 5 feet, five 12'-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete)											
4+60	5+80	120	[redacted]	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging, Dry Timber and foot blocks are in fair to good condition, Foot blocks are covered in ballast and debris along west sidewall, Bedrock appears to be less than 2' behind timber lagging (lagging almost complete throughout section)												
5+80	5+95	15	[redacted]	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging, Dry Timber and foot blocks are in fair to good condition generally, Lagging fell out in west sidewall, rotted at bottom, some rock debris behind lagging, Exposed Bedrock appears to be massive and competent	Remove timber sets and rotted timber lagging and clean area from rock debris, - Install rockbolts (rockbolt rows at 5'-spacing, five 12'-long rockbolts per row), - Apply shotcrete to the desired thickness of 4 inches			3	180	1080	13			15	5	
5+95	6+44	49	[redacted]	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4' spacing on wood foot blocks with timber lagging, Dry Timber and foot blocks are in fair to good condition generally, Tracks start to become muddy again at around Sta 6+20 with signs of pumping	(Current conditions of timber lining and wood foot blocks are fair to good generally However timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row-spacing 5 feet, five 12'-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete)											
6+44	7+29	85	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	4	Y	6	Timber sets at 4'-spacing on concrete curb with timber lagging, Footing of posts embedded in concrete curb one inch Dry												
7+29	7+68	39	[redacted]	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging, Dry, Timber and foot blocks are in fair to good condition generally, Tracks are in very poor condition and totally sunk in wet mud, sagging (lowered?) track at approximately Sta 7+50												v muddy ballast Sta 7+00 to 11+00
7+68	7+80	12	[redacted]	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging - East sidewall Rotted lagging with debris piled up 8'-12' high behind it, one post is rotted, Bedrock is exposed roughly 2' behind lagging	Remove timber sets and rotted timber lagging and clean area from rock debris, - Install rockbolts (rockbolt rows at 5'-spacing, five 12'-long rockbolts per row), - Apply shotcrete to the desired thickness of 4 inches			2	120	864	10			12	4	
7+80	8+52	72	[redacted]	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging Dry, Timber and foot blocks are in fair to good condition generally, Severe drainage problem throughout this section Track, ditches and footings of timber sets are entirely covered in wet mud	(Current conditions of timber lining and wood foot blocks are fair to good generally However timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row-spacing 5 feet, five 12'-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete)											

ODOT RAIL STUDY
TUNNEL 17
Coos Bay Subdivision, Oregon
MP 727.70 to 727.83

Station		Length, ft	Repair Level	Lining		Concrete Curb		Comments	Repairs	Steel Sets		Rockbolts		Shotcrete		Concrete		Timber Sets		Comments
From	To			Type	Set Spacing, ft	Y/N	Height above TOR, in			ft	No	Rows	LF	ft²	cy	ft²	cy	ft.	No	9/13/08 Visit
8+52	8+69	17	3	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Timber sets at 4'-spacing on wood foot blocks with timber lagging. Entire section sagged 12 inches wood boards were used to strap sets together foot blocks are crushed Bedrock appears to be close behind lagging	Remove timber sets and timber lagging and clean area from rock debris. - Install rockbolts (rockbolt rows at 5'-spacing, five 12'-long rockbolts per row). - Apply shotcrete to the desired thickness of 4 inches			3	180	1224	15			17	5	
8+69	9+03	34	[illegible]	Shotcrete over Bedrock		N		Shotcrete over bedrock Dry												
9+03	10+54	151	[illegible]	Shotcrete over Bedrock		Y	12	Shotcrete over bedrock concrete curb is present along both sides of tunnel, Track appears to be lowered in this section												
10+54	11+45	91	[illegible]	Shotcrete over Steel Sets	2	Y	12	Shotcrete over steel sets on concrete curb at 2'-spacing Drip at Sta 11+10												
11+45	12+00	55	[illegible]	Concrete Barrel				Concrete barrel Seepage in crown at contact of barrel and steel sets												
12+00	12+00	0	[illegible]	Concrete Portal				South Portal @ MP 727 83												
									Total	0	0	8	480	3168	38	0	0	44	14	

Total Length (ft)	1200	
Repair Level 3 (ft)	17	
Repair Level 4 (ft)	12	55
Repair Level 4-5 (ft)	15	
Repair Level 5 (ft)	1156	

Repair Level

[illegible]	Repairs should be completed immediately to <6 months
2	Repairs should be completed in 0 to 12 months
3	Repairs should be completed in 12 - 30 months
[illegible]	Repairs should be completed in 30 - 48 months
[illegible]	No immediate repairs required based on the current conditions

COST ESTIMATE FOR REPAIR LEVELS 1 TO 5

Est Total Steel Sets (No)	0	(Est Unit Rates $5300/per set)	Est Total Construction Costs	$0
Est Total Rockbolts (LF)	480	(Est Unit Rates $85/per LF)	Est Total Construction Costs	$40 800
Est Total Concrete (cy)	0	(Est Unit Rates $110/per CY)	Est Total Construction Costs	$0
Est Total Shotcrete (cy)	38	(Est Unit Rates $1000/per CY)	Est Total Construction Costs	$38 000
Est Total Timber Sets (No)	14	(Est Removal Unit Rate $1600/per set)	Est Total Removal Costs	$22,400
			Est Sub Total for Repairs	$101,200
			Mobilization (15%)	$15,180
			Contingency (20%)	$20,240
			Est Total of Construction Cost	$136 620

ODOT RAIL STUDY
TUNNEL 18
Coos Bay Subdivision, Oregon
MP 734.48 to 734.77

Station From	Station To	Length, ft	Repair Level	Lining Type	Lining Set Spacing, ft	Concrete Curb Y/N	Concrete Curb Height above TOR, in	Comments	Repairs	Steel Sets ft	Steel Sets No	Rockbolts Rows	Rockbolts LF	Shotcrete ft²	Shotcrete cy	Concrete ft²	Concrete cy	Timber Sets ft.	Timber Sets No	Comments 9/13/08 Visit
0+00	0+00	0		Shotcrete over Steel Sets	2	Y	12	North Portal @ Sta 734 48												Ballast v dirty Sta 0+00 to 4+00
0+00	1+02	102		Shotcrete over Steel Sets	2	Y	12	Shotcrete over Steel Sets at 2'-spacing on concrete curb, Shotcrete ~6" thick over steel sets Dry												
1+02	4+00	298		Shotcrete over Steel Sets	4	Y	12	Shotcrete over Steel Sets at 4'-spacing on concrete curb Shotcrete ~6" thick over steel sets Dry												
4+00	4+12	12		Shotcrete over Steel Sets	4	Y	0	Shotcrete over Steel Sets at 4'-spacing on concrete curb Shotcrete ~6" thick over steel sets, Dry Gradual change in curb height beginning at the North Portal (12" above TOR to 0" above TOR)												
4+12	6+94	282		Shotcrete over Steel Sets	2	Y	0 and 6	Shotcrete over Steel Sets at 2'-spacing on concrete curb Shotcrete ~6"-8"-thick over steel sets, Dry generally - Crack along center line of crown between Sta 5+70 and 6+30 drip from existing drain in crown adjacent to crack at Sta 5+82 - Abrupt change in curb height, raised 6" at Sta 5+84 - Fouled tracks												
6+94	9+05	211		Shotcrete over Steel Sets	4	Y	6 and 0	Shotcrete over Steel Sets at 2'-spacing on concrete curb Shotcrete ~6"-8"-thick over steel sets, Dry - Abrupt change in curb height, lowered 6" at Sta 7+00												
9+05	9+22	17	3 - 4	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Bottom of timber posts and/or wood footing blocks show initial stages of deterioration but do not show signs of advanced distress or movement	Replacement of wood footing blocks (and bottom of timber posts when deteriorated) Establish new footing for timber sets with shotcrete on bedrock or a minimum of 2 ft below top or rail, whichever is shallower OR Remove existing timber lining, install rockbolts (row-spacing 5 feet, five 12'-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete)			3	180	1224	15			17	5	
9+22	9+36	14	2	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Bottom of timber posts and/or wood footing blocks are severely deteriorated, show signs of crushing, squeezing, and/or shifting, and/or are cracked Sets sagging by 6" to 12" along east wall	Cutting and removal of deteriorated wood footing blocks and rotted bottom sections of timber posts Establish new footing for timber sets with shotcrete on bedrock or a minimum of 2 ft below top of rail, whichever is shallower OR Remove existing timber lining, install rockbolts (row-spacing 5 feet five 12'-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete)			3	180	1008	12			14	5	
9+36	9+60	24	3 - 4	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Bottom of timber posts and/or wood footing blocks show initial stages of deterioration but do not show signs of advanced distress or movement	Replacement of wood footing blocks (and bottom of timber posts when deteriorated) Establish new footing for timber sets with shotcrete on bedrock or a minimum of 2 ft below top or rail whichever is shallower OR Remove existing timber lining install rockbolts (row-spacing 5 feet, five 12'-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete)			5	300	1728	21			24	7	
9+60	10+78	118	2	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Bottom of timber posts and/or wood footing blocks are severely deteriorated, show signs of crushing, squeezing, and/or shifting, and/or are cracked Posts settled 12" in many areas on both sides of tunnel	Cutting and removal of deteriorated wood footing blocks and rotted bottom sections of timber posts Establish new footing for timber sets with shotcrete on bedrock or a minimum of 2 ft below top of rail whichever is shallower OR Remove existing timber lining install rockbolts (row-spacing 5 feet five 15 -long rockbolts per row) and apply 6"-thick steel fiber reinforced shotcrete)			24	1440	8496	106			118	31	
10+78	11+10	32		Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Six posts on the east side kicked out at the bottom and shifted into tunnel by up to 2 ft (smallest distance to nearest rail is 3 5 ft measured at top of rail) Rock fragments and crushed rotted timber lagging is caught behind displaced timber posts Bedrock is exposed locally	Removal of six existing timber sets (or shifted posts), Installation of six replacement steel sets, Installation of rockbolts (rockbolt rows at 5'-spacing, six 15 -long rockbolts per row) Application of shotcrete to the desired thickness of 6", Footing blocks and bottom of posts of the two sets to the south of the failed area need to be cut and removed, and then replaced with shotcrete along the east side			6	540	2304	42			32	9	No overall change in tunnel conditions
11+10	12+80	170	2	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Bottom of timber posts and/or wood footing blocks are severely deteriorated show signs of crushing squeezing, and/or shifting and/or are cracked Sagged posts on east side between Sta 11+10 and 12+00 sagged posts on west side between Sta 11+00 and 11+20, Sta 11+72 and 11+76,and Sta 12+72 and 12+80) - Fouled track shoulder heaving from Sta 11+20 to 12+30	Cutting and removal of deteriorated wood footing blocks and rotted bottom sections of timber posts Establish new footing for timber sets with shotcrete on bedrock or a minimum of 2 ft below top of rail whichever is shallower OR Remove existing timber lining install rockbolts (row-spacing 5 feet, five 12'-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete)			34	2040	17240	154			170	44	

ODOT RAIL STUDY
TUNNEL 18
Coos Bay Subdivision, Oregon
MP 734.48 to 734.77

Station From	Station To	Length, ft	Repair Level	Lining Type	Lining Set Spacing, ft	Concrete Curb Y/N	Concrete Curb Height above TOR, in	Comments	Repairs	Steel Sets ft	Steel Sets No	Rockbolts Rows	Rockbolts LF	Shotcrete ft²	Shotcrete cy	Concrete ft²	Concrete cy	Timber Sets ft	Timber Sets No	Comments 9/13/08 Visit
12+80	13+22	42	3 - 4	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Bottom of timber posts and/or wood footing blocks show initial stages of deterioration, but do not show signs of advanced distress or movement	Replacement of wood footing blocks (and bottom of timber posts when deteriorated) Establish new footing for timber sets with shotcrete on bedrock or a minimum of 2 ft below top or rail, whichever is shallower OR Remove existing timber lining install rockbolts (row-spacing 5 foot, five 12'-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete)			8	480	3024	38			42	12	
13+22	14+20	98	2	Timber Sets on Wood Foot Blocks with Timber Lagging	4	N		Bottom of timber posts and/or wood footing blocks are severely deteriorated, show signs of crushing, squeezing and/or shifting, and/or are cracked Sagged posts on east side between Sta 13+22 and 13+58 (~12"-sag), and Sta 14+06 and 14+16 (<6"-sag). Sagged posts on west side between Sta 13+22 and 13+50, and at sta 13+94	Replacement of wood footing blocks (and bottom of timber posts when deteriorated) Establish new footing for timber sets with shotcrete on bedrock or a minimum of 2 ft below top or rail whichever is shallower OR Remove existing timber lining install rockbolts (row-spacing 5 feet, five 12'-long rockbolts per row) and apply 4"-thick steel fiber reinforced shotcrete)			20	1200	7056	88			98	26	
14+20	14+82	62	[redacted]	Timber Sets on Concrete Curb with Timber Lagging	4	Y	6	Timber posts and lagging in fair to good condition	(Current conditions of timber lining and wood foot blocks are fair to good generally However, timber will deteriorate over time and may cause problems in these sections in the future Replacing the timber lining with rockbolts and steel fiber reinforced shotcrete is recommended in the future in order to maintain the long-term stability of the tunnel Future repairs should include installation of rockbolts (row-spacing 5 feet five 12'-long rockbolts per row) and application of 4"-thick steel fiber reinforced shotcrete OR Replacement of wood footing blocks and bottom of timber posts when deteriorated Establish new footing for timber sets with shotcrete on bedrock or a minimum of 2 ft below top or rail whichever is shallower)											
14+82	15+27	45		Timber Sets with Timber Lagging	4	Y	6	Posts on east side shifted into tunnel at the bottom Rubble and detached rotted timber lagging and cribbing caught behind posts between Sta 15+20 and 15+27 Timber set is missing at Sta 15+18 Timber lagging rotted and missing locally, Some timber sets are separated at butt joints and from timber lagging. Posts are rotted at the bottom along the east side between Sta 15+00 and 15+10	Removal of ten existing timber sets, Installation of rock bolts (rockbolt rows at 5'-spacing six 15'-long rockbolts per row) Application of shotcrete to desired thickness of 6"			9	675	3240	60			45	12	
15+27	15+80	53		Concrete Barrel				Concrete barrel												
15+80	15+80	0		Concrete Portal				South Portal @ Sta 734 77												
									Total	0	0	112	7035	40320	536	0	0	560	149	

Total Length (ft)	1580
Repair Level 1 (ft)	77
Repair Level 2 (ft)	400
Repair Level 3-4 (ft)	83
Repair Level 5 (ft)	1020

Repair Level

[redacted]	Repairs should be completed immediately to <6 months
2	Repairs should be completed in 0 to 12 months
3	Repairs should be completed in 12 - 30 months
[redacted]	Repairs should be completed in 30 - 48 months
[redacted]	No immediate repairs required based on the current conditions

COST ESTIMATE FOR REPAIR LEVELS 1 AND 2

Est Total Steel Sets (No)	0	(Est Unit Rates $5300/per set)	Est Total Construction Costs	$0
Est Total Rockbolts (LF)	6075	(Est Unit Rates $85/per LF)	Est Total Construction Costs	$516 375
Est Total Concrete (cy)	0	(Est Unit Rates $110/per CY)	Est Total Construction Costs	$0
Est Total Shotcrete (cy)	462	(Est Unit Rates $1000/per CY)	Est Total Construction Costs	$462 000
Est Total Timber Sets (No)	125	(Est Removal Unit Rate $1600/per set)	Est Total Removal Costs	$200,000

Est Sub Total for Level 1 and 2 Repairs $1 178,375
Mobilization (15%) $176 756
Contingency (20%) $235 675
Est Total of Level 1 and 2 Construction Cost $1,590,806

COST ESTIMATE FOR REPAIR LEVELS 1 TO 5

Est Total Steel Sets (No)	0	(Est Unit Rates $5300/per set)	Est Total Construction Costs	$0
Est Total Rockbolts (LF)	7035	(Est Unit Rates $85/per LF)	Est Total Construction Costs	$597,975
Est Total Concrete (cy)	0	(Est Unit Rates $110/per CY)	Est Total Construction Costs	$0
Est Total Shotcrete (cy)	536	(Est Unit Rates $1000/per CY)	Est Total Construction Costs	$536 000
Est Total Timber Sets (No)	149	(Est Removal Unit Rate $1600/per set)	Est Total Removal Costs	$238,400

Est Sub Total for Repairs $1,372,375
Mobilization (15%) $205,856
Contingency (20%) $274 475
Est Total of Construction Cost $1,852,706

ODOT RAIL STUDY
TUNNEL 19
Coos Bay Subdivision, Oregon
MP 745.62 to 746.41

Station		Length, ft	Repair Level	Lining		Concrete Curb		Comments	Repairs	Steel Sets		Rockbolts		Shotcrete		Concrete		Timber Sets	
From	To			Type	Set Spacing, ft	Y/N	Height above TOR, in			ft	No	Rows	LF	ft²	cy	ft²	cy	ft.	No
0+00	0+00	0	[redacted]	Shotcrete over Steel Sets		Y	1	North Portal @ MP 745 62, Skin slides at the west side of the portal area occurred in the past and resulted in blocked drainage (muddy track and ditches inside the tunnel)											
0+00	0+35	35		Shotcrete over Steel Sets	2	Y	1	Shotcrete ~6" thick over steel sets, dry, fouled tracks											
0+35	0+50	15		Shotcrete over Steel Sets	4	Y	1	Shotcrete ~6" thick over steel sets, dry fouled tracks											
0+50	10+86	1036		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock, shotcrete cover is thin in general (0 5" to 2 0" thick) - 0+00 to 2+10 (approx) 6"curved track - Drainage ditches along both sides of tunnel are in very bad shape and essentially non-existent, tracks are covered in mud (no ballast visible until ~Sta 7+00) ditches clear and show up approximately between Sta 5+00 and 6+00	In general, the shotcrete application over bedrock appears to be thin (less than 2 inches) throughout the tunnel, the shotcrete is not reinforced, Color changes of the shotcrete indicate multiple applications in the past suggesting repair of previously spalled shotcrete, In general, the present shotcrete cover in the tunnel is in good condition and does not show signs of cracking and advancing deterioration, However, spalling shotcrete was observed at several locations in the tunnel some associated with small rockfalls, It is recommended to cover exposed bedrock in areas where shotcrete is spalling (sidewalls 2"-thick spalled areas 4"-thick) within the next 48 to 60 months in order to prevent further weathering and deterioration of bedrock and potential rockfalls, this will also help to prevent the spalling from progressing into the existing shotcrete application surrounding the spalled areas Due to the generally thin shotcrete cover now spalling of shotcrete has to be expected in the future at any location throughout the tunnel because of the good condition of the existing shotcrete cover and the dry state of the tunnel howev										
10+86	10+91	5		Shotcrete over Bedrock		N	-	Spalling shotcrete in tunnel crown (~ 5'x5'), shotcrete fragments on track						360	3				
10+91	11+14	23		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock. shotcrete cover is thin in general (0 5" to 2 0"-thick)											
11+14	11+20	6		Shotcrete over Bedrock		N	-	Spalling shotcrete in tunnel crown (~ 6'x3') associated with rock fall, shotcrete fragments and rock fragments (largest rock ~ 4'x2'x1') on track and in ditches						432	4				
11+20	11+31	11		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock, shotcrete cover is thin in general (0 5" to 2 0" thick)											
11+31	11+36	5		Shotcrete over Bedrock		N	-	Spalling shotcrete in tunnel crown (~ 5'x3') associated with rock fall, shotcrete fragments and small rock fragments on track						360	3				
11+36	26+32	1496		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock, shotcrete cover is thin in general (0 5" to 2 0"-thick), color changes in shotcrete (light-gray and dark-gray) suggest multiple applications or previous shotcrete repair work - Slight drip from E-springline at Sta 13+60, - Both ditches are silted up and muddy again starting at around Sta 26+00											
26+32	26+76	44		Shotcrete over Bedrock		N	-	Spalling shotcrete in tunnel crown (~ 6'-15 -wide area) associated with rock fall, shotcrete fragments and small rock fragments on ground						3168	29				
26+76	32+20	544		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock, shotcrete cover is thin in general (0 5" to 2 0"-thick)											
32+20	32+40	20		Shotcrete over Bedrock		N	-	Spalling shotcrete across tunnel crown (~ 20'-wide) associated with rock fall shotcrete fragments and small rock fragments on ground						1440	13				
32+40	32+70	30		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock, shotcrete cover is thin in general (0 5" to 2 0"-thick)											
32+70	32+90	20		Shotcrete over Bedrock		N	-	Area with spalling shotcrete (8'x5 and 10'x4') in tunnel crown (< 1 0"-thick application), shotcrete fragments on ground scattered small rock fragments on track at Sta 32+70						1440	13				
32+90	33+70	80		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock shotcrete cover is thin in general (0 5" to 2 0" thick)											
33+70	33+92	22		Shotcrete over Bedrock		N	-	Area with patches of spalling shotcrete in tunnel crown (0 5"-1 0"-thick application), shotcrete fragments on ground (no rock fragments) - track and ditches are very muddy and carry wood debris (condition continues to S-Portal)						,584	14				
33+92	35+62	170		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock shotcrete cover is thin in general (0 5" to 2 0"-thick)											
35+62	35+90	28		Shotcrete over Bedrock		N	-	Patches of spalling shotcrete in tunnel crown (0 5"-1 0"-thick application) shotcrete fragments and scattered small rock fragments on ground						2016	18				
35+90	36+92	102		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock, shotcrete cover is thin in general (0 5" to 2 0"-thick)											
36+92	36+99	7		Shotcrete over Bedrock		N	-	Spalling shotcrete in tunnel crown (< 0 5"-thick application)						504	4				
36+99	37+93	96		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock, shotcrete cover is thin in general (0 5" to 2 0" thick)											
37+93	38+26	33		Shotcrete over Bedrock		N	-	Patches of thin spalling shotcrete in tunnel crown						2376	22				
38+26	38+50	24		Shotcrete over Bedrock		N	-	Spalling shotcrete across tunnel crown (~ 20'-wide)						1728	16				
38+50	38+68	18		Shotcrete over Bedrock		N	-	Spalling shotcrete in western half of tunnel crown (~ 10'-wide approx)						1152	10				
38+68	38+84	16		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock shotcrete cover is thin in general (0 5" to 2 0"-thick)											
38+84	39+21	37		Shotcrete over Bedrock		N	-	Two 5' to 10'-wide patches of thin spalling shotcrete in tunnel crown						2664	24				
39+21	39+28	7		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock, shotcrete cover is thin in general (0 5" to 2 0"-thick)											
39+28	39+33	5		Shotcrete over Bedrock		N	-	Spalling shotcrete in tunnel crown (5'x4')						360	3				
39+33	39+56	23		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock, shotcrete cover is thin in general (0 5" to 2 0" thick)											
39+56	39+59	3		Shotcrete over Bedrock		N	-	Spalling shotcrete in tunnel crown (3'x2')						218	2				
39+59	39+97	38		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock, shotcrete cover is thin in general (0 5" to 2 0"-thick)											
39+97	40+02	5		Shotcrete over Bedrock		N	-	Spalling shotcrete in tunnel crown (5'x5')						360	3				
40+02	41+00	98		Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock, shotcrete cover is thin in general (0 5" to 2 0" thick)											
41+00	41+07	7		Shotcrete over Bedrock		N	-	Spalling shotcrete in tunnel crown (7'x6')						504	4				

ODOT RAIL STUDY
TUNNEL 19
Coos Bay Subdivision, Oregon
MP 745.62 to 746.41

Station From	Station To	Length, ft	Repair Level	Lining Type	Lining Set Spacing, ft	Concrete Curb Y/N	Concrete Curb Height above TOR, in	Comments	Repairs	Steel Sets ft	Steel Sets No	Rockbolts Rows	Rockbolts LF	Shotcrete ft²	Shotcrete cy	Concrete ft²	Concrete cy	Timber Sets ft	Timber Sets No
41+07	41+38	31	[illegible]	Shotcrete over Bedrock		N	-	Shotcrete applied over bedrock, shotcrete cover is thin in general (0 5" to 2 0" thick) - 41+21 to 41+38 Seepage at springline along W-sidewall											
41+38	41+47	9	[illegible]	Shotcrete over Bedrock		N	-	Spalling shotcrete in tunnel crown (9'x4')						648	6				
41+47	42+02	55	[illegible]	Concrete		N	-	Concrete Barrel											
42+02	42+02	0	[illegible]	Concrete		N	-	South Portal @ MP 746 41 Slun slides at the east side of the portal area occurred in the past and resulted in blocked drainage (muddy track and ditches inside the tunnel)											
									Total	0	0	0	0	21312	191	0	0	0	0

Total Length (ft)	4202
Repair Level 4-5 (ft)	291
Repair Level 5 (ft)	3911

Repair Level

[illegible]	Repairs should be completed immediately to <6 months
2	Repairs should be completed in 0 to 12 months
3	Repairs should be completed in 12 - 30 months
[illegible]	Repairs should be completed in 30 48 months
[illegible]	No immediate repairs required based on the current conditions

COST ESTIMATE FOR REPAIR LEVELS 1 TO 5

Est Total Steel Sets (No)	0	(Est Unit Rates $5300/per set)	Est Total Construction Costs	$0
Est Total Rockbolts (LF)	0	(Est Unit Rates $85/per LF)	Est Total Construction Costs	$0
Est Total Concrete (cy)	0	(Est Unit Rates $110/per CY)	Est Total Construction Costs	$0
Est Total Shotcrete (cy)	191	(Est Unit Rates $1000/per CY)	Est Total Construction Costs	$191,000
Est Total Timber Sets (No)	0	(Est Removal Unit Rate $1600/per set)	Est Total Removal Costs	$0
			Est Sub Total for Repairs	$191,000
			Mobilization (15%)	$28,650
			Contingency (20%)	$38,200
			Est Total of Construction Cost	$257,850

ODOT RAIL STUDY
TUNNEL 20
Coos Bay Subdivision, Oregon
MP 750.12 to 750.28

Station From	Station To	Length, ft	Repair Level	Lining Type	Lining Set Spacing, ft	Concrete Curb Y/N	Concrete Curb Height above TOR, in	Comments	Repairs	Steel Sets ft	Steel Sets No	Rockbolts Rows	Rockbolts LF	Shotcrete ft²	Shotcrete cy	Concrete ft²	Concrete cy	Timber Sets ft	Timber Sets No
0+00	0+00	0		Concrete Portal		N		North Portal @ MP 750 12											
0+00	0+54	54		Concrete Barrel		N		Generally dry to damp, - Thin crack with seepage on west sidewall at ~Sta 0+09 - Open crack (1/4"-wide) in east sidewall at ~Sta 0+25 - Scattered drips around Sta 0+42											
0+54	1+53	99		Shotcrete over Bedrock		N		Generally thin shotcrete cover, especially in crown Shotcrete is not reinforced, No cracks observed - Bedrock exposed in crown between Sta 1+43 and 1+53											
1+53	1+73	20	3	Shotcrete over Steel Sets	3.5	Y	6	Shotcreted steel sets to bridge overbreak/cave-in area (steel sets do not touch and support ground in crown), Caved-in section is 10'-15' high in crown Loose bedrock material, originating from open ground behind shotcreted steel sets, piled up at the bottom of the east sidewall at each end of the section, Dry	Exposed bedrock in overbreak/caved-in area is instable and actively deteriorating and falling out no ground support established - steel sets only work as "canopy" Establish a bulkhead on both ends of the steel set section and backfill the void space with cementicious material This may require the application of shotcrete and the construction of two additional steel sets at each end of the section	8	2			576	8	672	124		
1+73	5+08	335		Shotcrete over Bedrock		N		Generally thin shotcrete cover, especially in crown Shotcrete is not reinforced, Dry in general, - 9 rockbolts scattered in crown between Sta 1+75 - 1+85 - Spalled shotcrete in crown (2'x2') at Sta 2+19 - 5 rockbolts scattered in crown between Sta 2+73 and 2+29 drip above western springline - Spalled shotcrete (2'x2') along west wall at Sta 2+46 2+51 and 2+58, - Seepage in west wall at roughly ~Sta 2+70 (fault?), - Spalled shotcrete in crown (3' x 1') at Sta 4+11											
5+08	5+53	45		Shotcrete over Bedrock		N		Generally thin shotcrete cover, especially in crown Shotcrete is not reinforced Dry in general, - 5 to 7'-high overbreak area between Sta 5+08 and 5+38 across crown, shotcreted from Sta 5+08 to 5+24 with some spalling at Sta 5+10 (4'x4'), Sta 5+14 (3'x2'), Sta 5+21 (5'x2'), and Sta 5+22 (1'x3') large spalling area with bedrock exposed between Sta 5+24 and 5+38, associated with scattered rock fall as indicated by debris on tunnel floor, - Spalling on east wall at Sta 5+37 (2'x2') and Sta 5+49 (4'x6') - Spalled shotcrete in crown at Sta 5+48 (3'x3')	Due to relatively large size of areas with spalled shotcrete (in addition to occasional rockfalls evidently) it is recommended to repair and secure the area with a 2" (over existing shotcrete in sidewalls) to 4" (over exposed bedrock)-thick steel fiber reinforced shotcrete cover					3240	30				
5+53	5+97	44		Shotcrete over Steel Sets	4' and 3'	Y	6	Shotcreted steel sets to bridge overbreak/cave-in area (steel sets do not touch and support ground in crown, locally), Overbreak is 3'-5' high in crown No signs of instabilities or rock falls were observed, Section consists of 12 steel sets at 4'-spacing generally last 3 sets at the south end of section at 3'-spacing	Establish a bulkhead on both ends of the steel set section and backfill the void space with cementicious material This may require the application of shotcrete at each end of the section					?	?	1056	117		
5+97	6+32	35		Shotcrete over Bedrock		N		Generally thin shotcrete over bedrock, Scattered small drip locations, Muddy track											
6+32	6+54	22		Shotcrete over Bedrock		N		Spalled shotcrete on east wall (8'x22')	Cover exposed bedrock in areas where shotcrete is spalling (including sidewalls 2"-thick spalled areas 4"-thick)					1584	14				
6+54	7+14	60		Shotcrete over Bedrock		N		Generally thin shotcrete over bedrock, Dry, Muddy Track											
7+14	7+26	12		Shotcrete over Bedrock		N		Spalled shotcrete in crown (12'x9')	Cover exposed bedrock in areas where shotcrete is spalling (including sidewalls 2"-thick spalled areas 4"-thick)					864	8				
7+26	8+20	94		Shotcrete over Bedrock		N		Generally thin shotcrete over bedrock spalled shotcrete in crown at Sta 7+62 (3'x4')											
8+20	8+74	54		Concrete Barrel		N		-Some scowering behind concrete barrel at contact at Sta 8+20, Drip zone in crown at Sta 8+41, Seepage from crack in west sidewall at Sta 8+45	- Scowering behind concrete barrel at contact at Sta 8+20, Drip zone in crown at Sta 8+41, Seepage from crack in west sidewall at Sta 8+45										
8+74	8+74	0		Concrete Portal		N		South Portal @ MP 750 28											
									Total	8	2	0	0	6264	60	1728	241	0	0

Total Length (ft)	874
Repair Level 3 (ft)	20
Repair Level 4 (ft)	44
Repair Level 4-5 (ft)	79
Repair Level 5 (ft)	731

Repair Level

1	Repairs should be completed immediately to <6 months
2	Repairs should be completed in 0 to 12 months
3	Repairs should be completed in 12 - 30 months
4	Repairs should be completed in 30 - 48 months
5	No immediate repairs required based on the current conditions

COST ESTIMATE FOR REPAIR LEVELS 1 TO 5

Est Total Steel Sets (No)	2	(Est Unit Rates $5300/per set)	Est Total Construction Costs	$10,600
Est Total Rockbolts (LF)	0	(Est Unit Rates $85/per LF)	Est Total Construction Costs	$0
Est Total Concrete (cy)	241	(Est Unit Rates $110/per CY)	Est Total Construction Costs	$26,510
Est Total Shotcrete (cy)	60	(Est Unit Rates $1000/per CY)	Est Total Construction Costs	$60,000
Est Total Timber Sets (No)	0	(Est Removal Unit Rate $1600/per set)	Est Total Removal Costs	$0
			Est Sub Total for Repairs	$97,110
			Mobilization (15%)	$14 567
			Contingency (20%)	$19 422
			Est Total of Construction Cost	$131,099

ODOT Rail Study
TUNNEL 21
Coos Bay Subdivision, Oregon
MP 751.21 to 751.30

Station From	Station To	Length, ft	Repair Level	Lining Type	Lining Set Spacing, ft	Concrete Curb Y/N	Concrete Curb Height above TOR, in	Comments	Repairs	Steel Sets ft	Steel Sets No	Rockbolts Rows	Rockbolts LF	Shotcrete ft²	Shotcrete cy	Concrete ft²	Concrete cy	Timber Sets ft	Timber Sets No
0+00	0+00	0		Concrete Portal		N		North Portal @ MP 751 21											
0+00	0+55	55		Concrete Barrel		N		In general dry Thin crack across concrete barrel with some seepage at Sta 0+10											
0+55	3+63	308		Shotcrete over Bedrock		N		Shotcrete cover generally in good condition, Shotcrete was applied after tunnel fire Shotcrete is steel fiber reinforced, Exposed bedrock at bottom 3' 4' of sidewalls (weathered sandstone with scattered siltstone layers), bedrock debris and shotcrete rebound piled along both sidewalls, - 3 rockbolts in crown at Sta 0+70 - 4 rockbolts in crown east of center line at ~Sta 1+94 - Thin crack in crown 4 rockbolts in crown at ~Sta 2+40	Extend 3"-thick shotcrete cover to the base of the sidewalls in order to prevent excessive weathering and deterioration of exposed sandstone which could result in undermining and spalling of the existing shotcrete application					3696	34				
3+63	4+24	61		Shotcrete over Steel Sets	2 5	Y	6	Non-reinforced shotcrete over steel sets, Dry, - Wire mesh exposed at ~Sta 3+75, - Scattered spalling between Sta 3+93 and 4+24),											
4+24	4+78	54		Concrete Barrel		N		Dry in general - Moist with some dripping at Sta 4+32											
4+78	4+78	0		Concrete Portal		N		South Portal @ MP 751 30											
Total Length (ft)		478							Total	0	0	0	0	3696	34	0	0	0	0
Repair Level 4-5 (ft)		308																	
Repair Level 5 (ft)		170																	

Repair Level

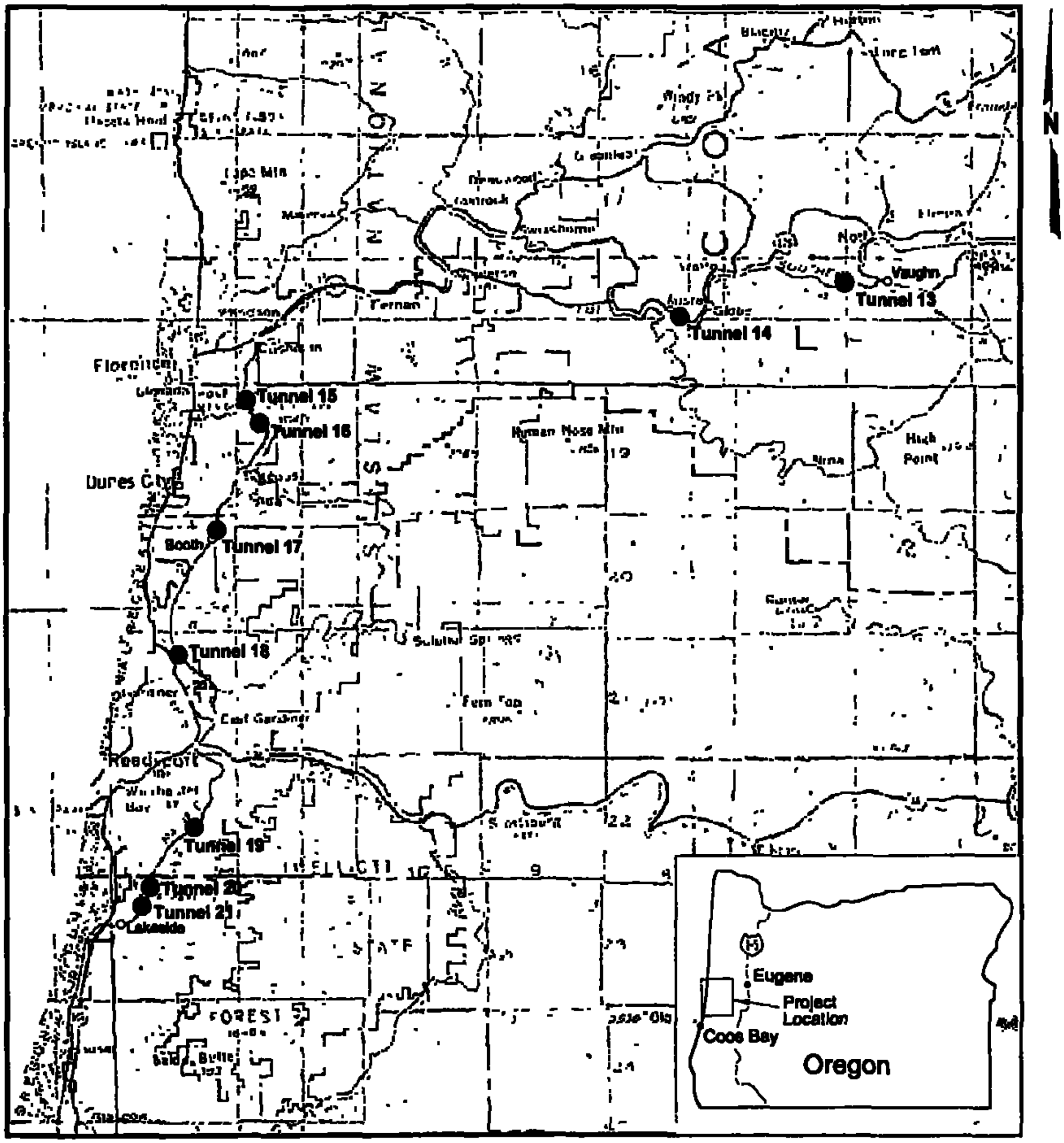
	Repairs should be completed immediately to <6 months
2	Repairs should be completed in 0 to 12 months
3	Repairs should be completed in 12 - 30 months
	Repairs should be completed in 30 - 48 months
	No immediate repairs required based on the current conditions

COST ESTIMATE FOR REPAIR LEVELS 1 TO 5

Est Total Steel Sets (No)	0	(Est Unit Rates $5300/per set)	Est Total Construction Costs	$0
Est Total Rockbolts (LF)	0	(Est Unit Rates $85/per LF)	Est Total Construction Costs	$0
Est Total Concrete (cy)	0	(Est Unit Rates $110/per CY)	Est Total Construction Costs	$0
Est Total Shotcrete (cy)	34	(Est Unit Rates $1000/per CY)	Est Total Construction Costs	$34 000
Est Total Timber Sets (No)	0	(Est Removal Unit Rate $1600/per set)	Est Total Removal Costs	$0
			Est Sub Total for Repairs	$34,000
			Mobilization (15%)	$5,100
			Contingency (20%)	$6,800
			Est Total of Construction Cost	$45,900

ODOT RAIL STUDY
ESTIMATED CONSTRUCTION COST SUMMARY
Coos Bay Subdivision, Oregon

Tunnel #	Milpost @ N-Portal	Length (ft.)	Repair Level 1&2 (incL2-3)						Repair Level 1 to 5					
			Steel Sets (No)	Rockbolts (LF)	Shotcrete (cy)	Remove Timber Sets (No)	Concrete (cy)	Est Total Construction Cost	Steel Sets (No)	Rockbolts (LF)	Shotcrete (cy)	Remove Timber Sets (No)	Concrete (cy)	Est Total Construction Cost
Tunnel 13	669 47	2496	-	2070	429	38	-	$898,763	-	9126	1243	150	-	$3,048,179
Tunnel 14	681 09	471	-	-	-	-	-	-	-	-	66	-	-	$89,100
Tunnel 15	720 73	2143	6	2600	84	72	-	$609,480	6	9914	624	346	-	$2,769,242
Tunnel 16	721 52	633	-	-	-	-	-	-	-	-	-	-	-	-
Tunnel 17	727 70	1200	-	-	-	-	-	-	-	480	38	14	-	$136,620
Tunnel 18	734 48	1580	-	6075	462	125	-	$1,590 806	-	7035	536	149	-	$1 652 706
Tunnel 19	745 62	4202	-	-	-	-	-	-	-	-	191	-	-	$257 850
Tunnel 20	750 12	874	-	-	-	-	-	-	2	-	60	-	241	$131,099
Tunnel 21	751 21	478	-	-	-	-	-	-	0	0	$34 000	0	0	$45 900
	Totals	14077	6	10745	975	235	-	$3,099,049	8	26555	36758	658	241	$8,330,695



0 7.5 15

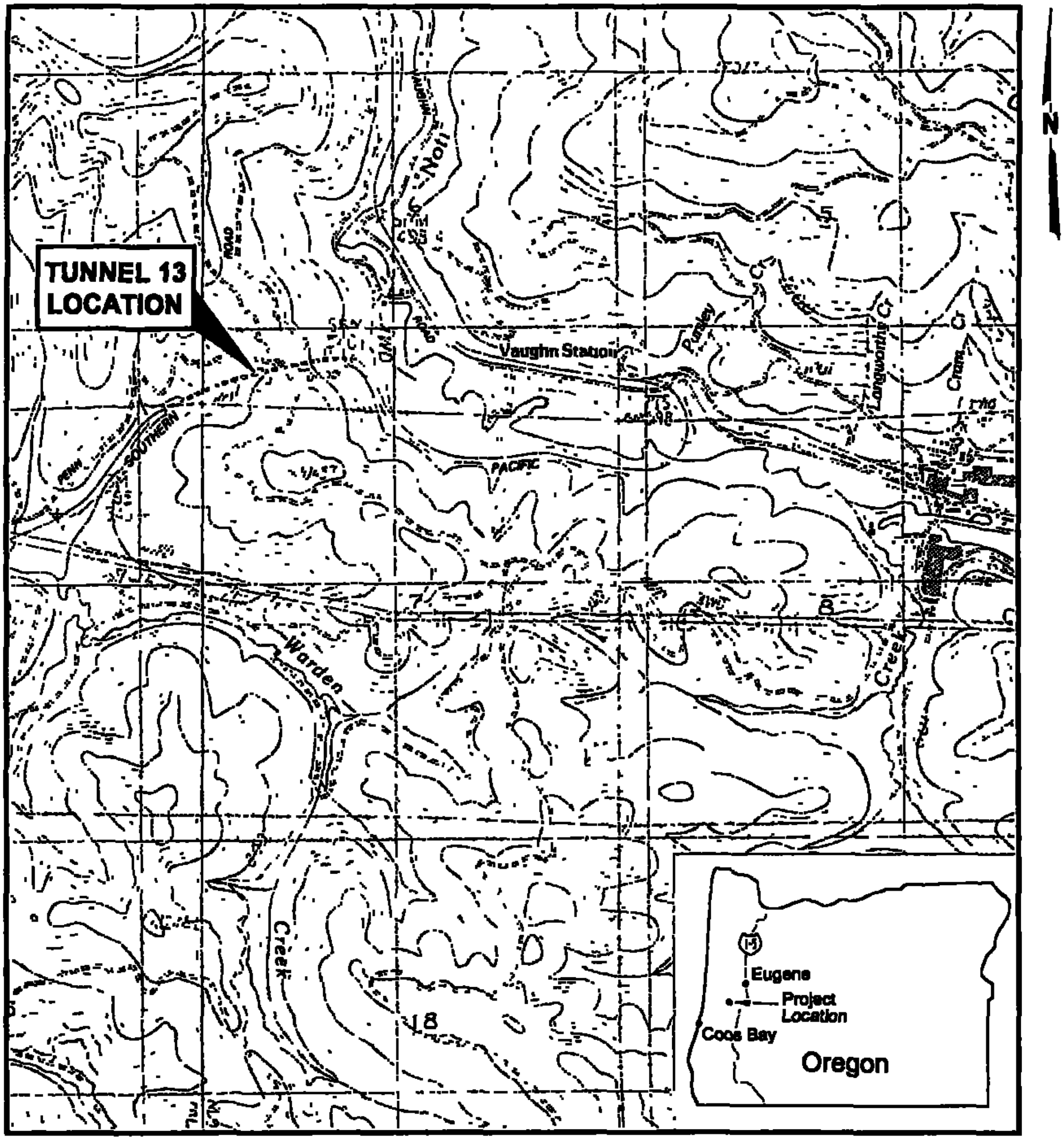
Approximate Scale in Miles

NOTE

Map adapted from electronic CD ROM USGS topographic map by TOPO!©2000 National Geographic Holdings.

ODOT Rail Division Rail Tunnels Assessments CORP Coos Bay Division Review
VICINITY MAP
September 2008 24-1-03505-002
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants — FIG. 1

Filename J:\241\03505-002\24-1-03505-002 Fig 1.dwg Date 09-25-2008 Login BAC



0 1/2 1

Scale in Miles

NOTE

Map adapted from 1:24,000 USGS topographic map of Noti, OR quadrangle, Provisional Edition, dated 1984.

ODOT Rail Division
Rail Tunnels Assessments
CORP Coos Bay Division Review

VICINITY MAP TUNNEL 13

September 2008 24-1-03505-002

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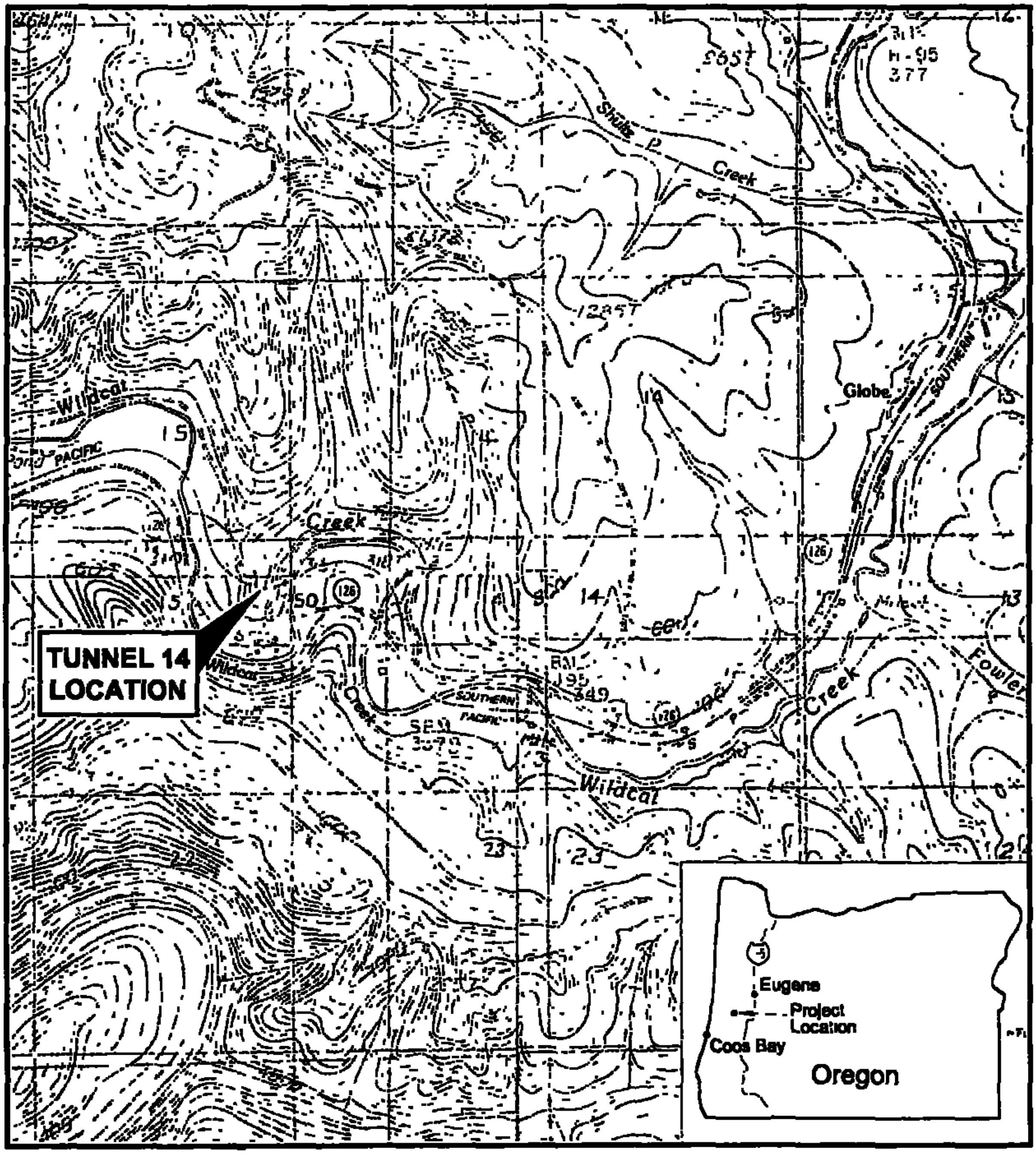
FIG. 2

Filename: J:\241\03505-002\24-1-03505-002 Fig 2.dwg Date: 09-25-2008 Login: BAC



0 1/2 1

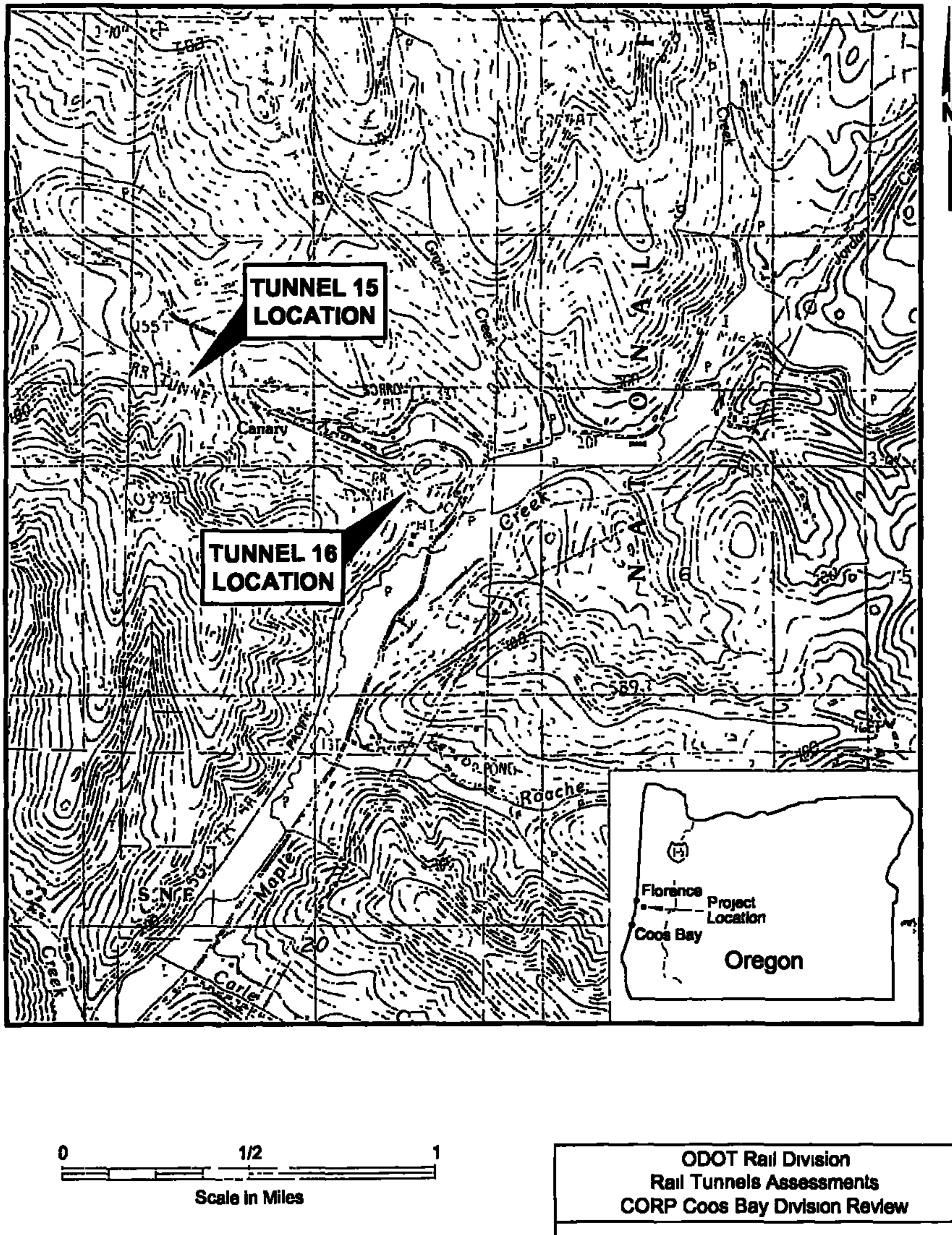
Scale in Miles

NOTE

Map adapted from 1:24,000 USGS topographic maps of *Clay Creek; Walton; Greenleaf, and Roman Nose Mtn*, OR quadrangles, all Provisional Editions, all dated 1984.

ODOT Rail Division *Rail Tunnels Assessments* CORP Coos Bay Division Review	
VICINITY MAP TUNNEL 14	
September 2008	24-1-03505-002
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	**FIG. 3**

Filename J:\241\03505-002\24-1-03505-002 Fig 3.dwg Date 09-25-2008 Login BAC



NOTE

Map adapted from 1:24,000 USGS topographic map of Florence, OR quadrangle, Provisional Edition, dated 1984.

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VICINITY MAP TUNNELS 15 AND 16	
September 2008	24-1-03505-002
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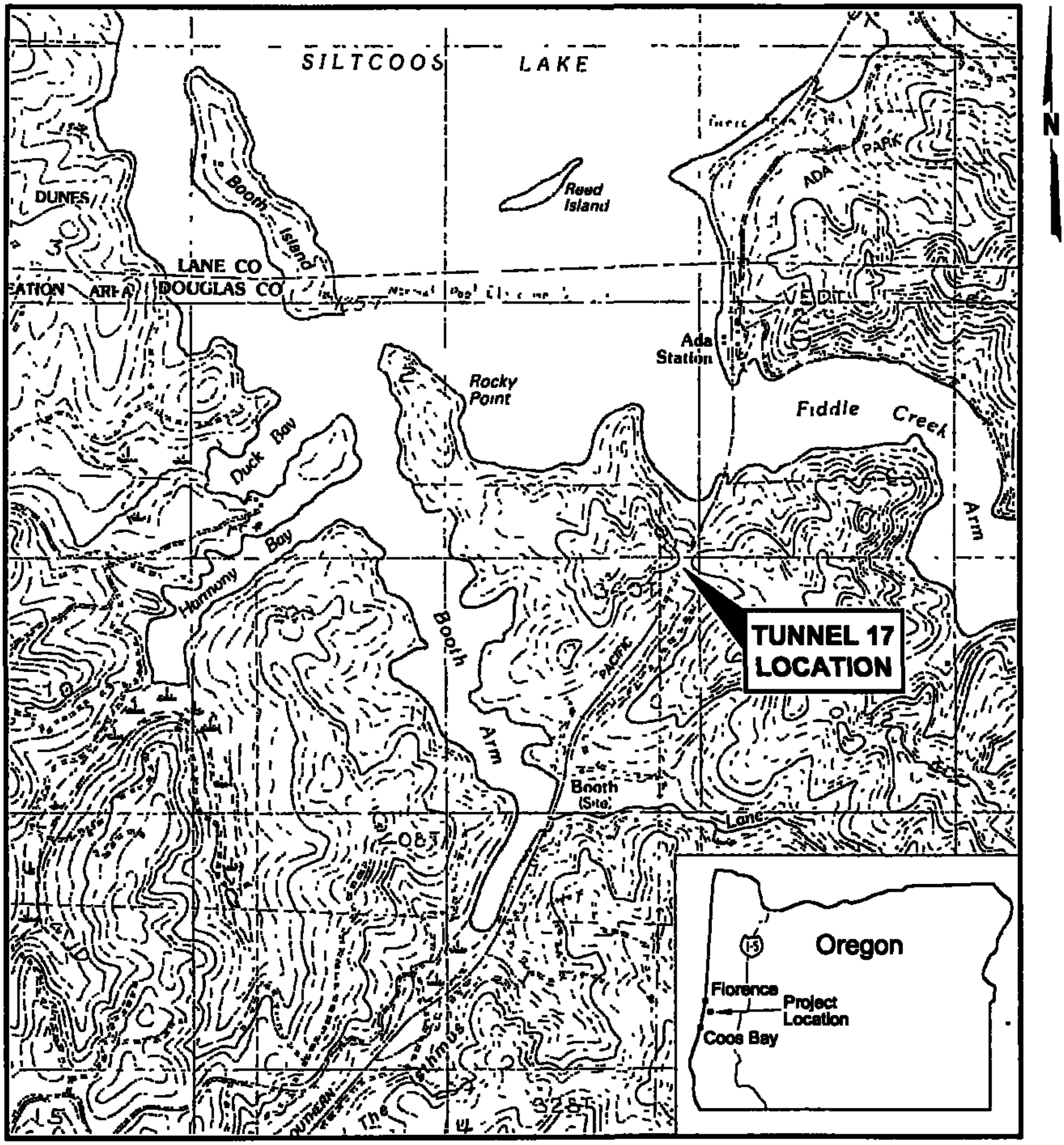
Filename: J:\241\03505-002\24-1-03505-002 Fig 4.dwg Date 09-25-2008 Login: BAC



0 1/2 1
Scale in Miles

NOTE

Map adapted from 1:24,000 USGS topographic map of Fivemile Creek, OR quadrangle, Provisional Edition, dated 1984.

ODOT Rail Division Rail Tunnels Assessments CORP Coos Bay Division Review	
VICINITY MAP TUNNEL 17	
September 2008	24-1-03505-002
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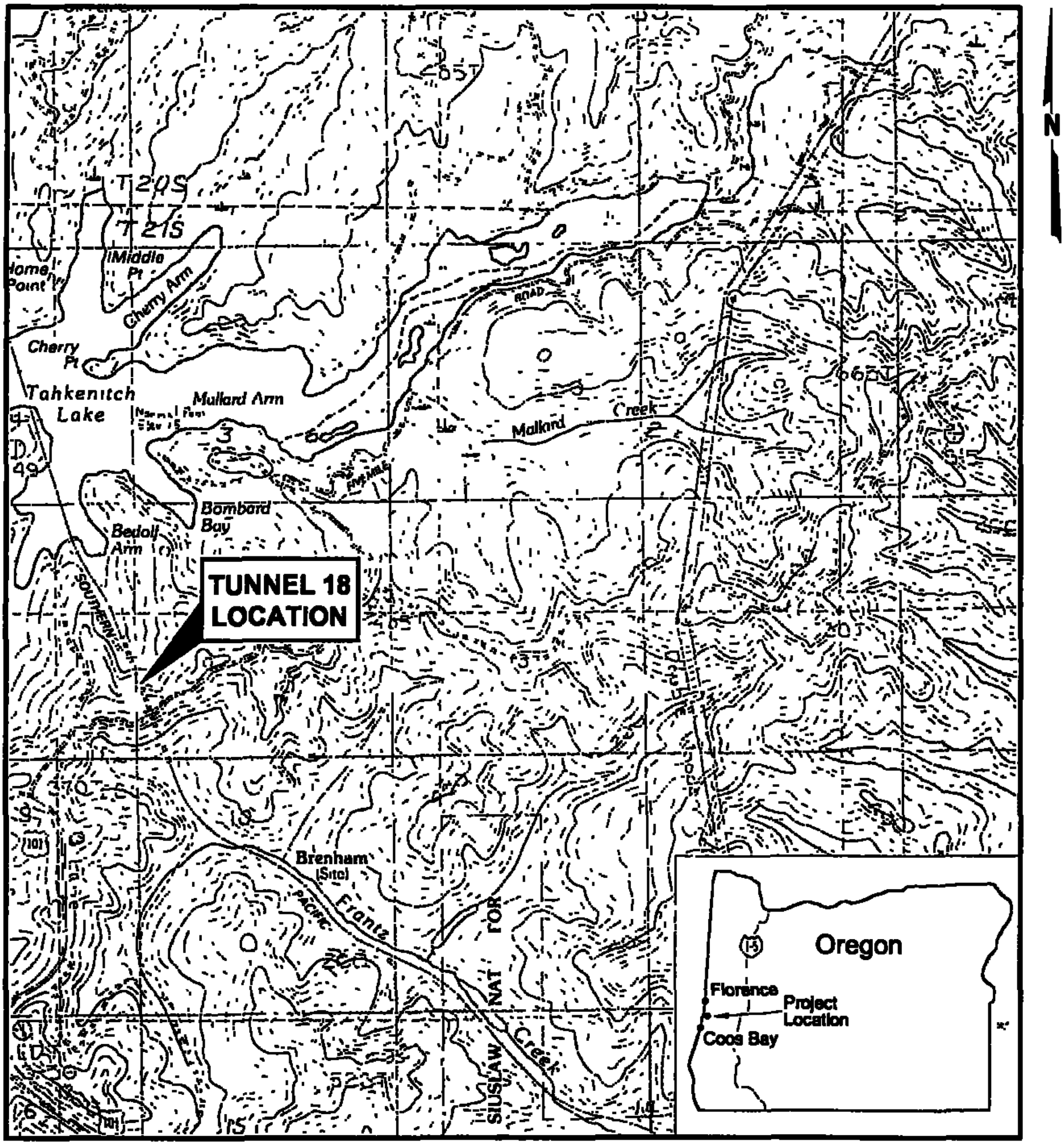
Filename J \241\03505-002\24-1-03505-002 Fig 5.dwg Date 09-25-2008 Login BAC



0 1/2 1

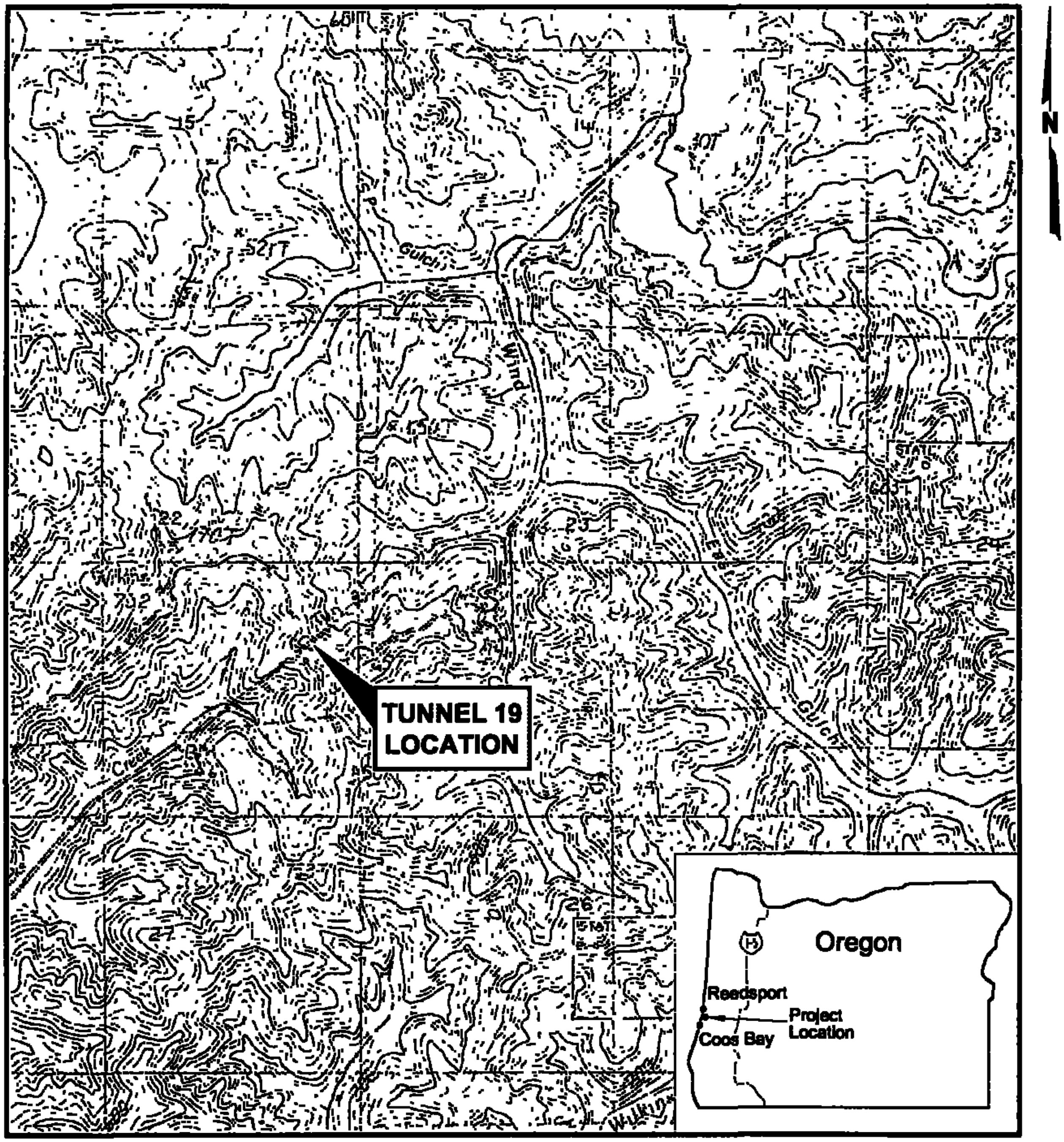
Scale in Miles

NOTE

Map adapted from 1:24,000 USGS topographic map of Fivemile Creek, OR quadrangle, Provisional Edition, dated 1984.

ODOT Rail Division Rail Tunnels Assessments CORP Coos Bay Division Review	
VICINITY MAP TUNNEL 18	
September 2008	24-1-03505-002
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	**FIG. 6**

Filename J:\241\03505-002\24-1-03505-002 Fig 6.dwg Date 09-25-2008 Login BAC



0 1/2 1

Scale in Miles

NOTE

Map adapted from 1:24,000 USGS topographic map of Reedsport, OR quadrangle, Provisional Edition, dated 1985.

ODOT Rail Division
Rail Tunnels Assessments
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VICINITY MAP TUNNEL 19

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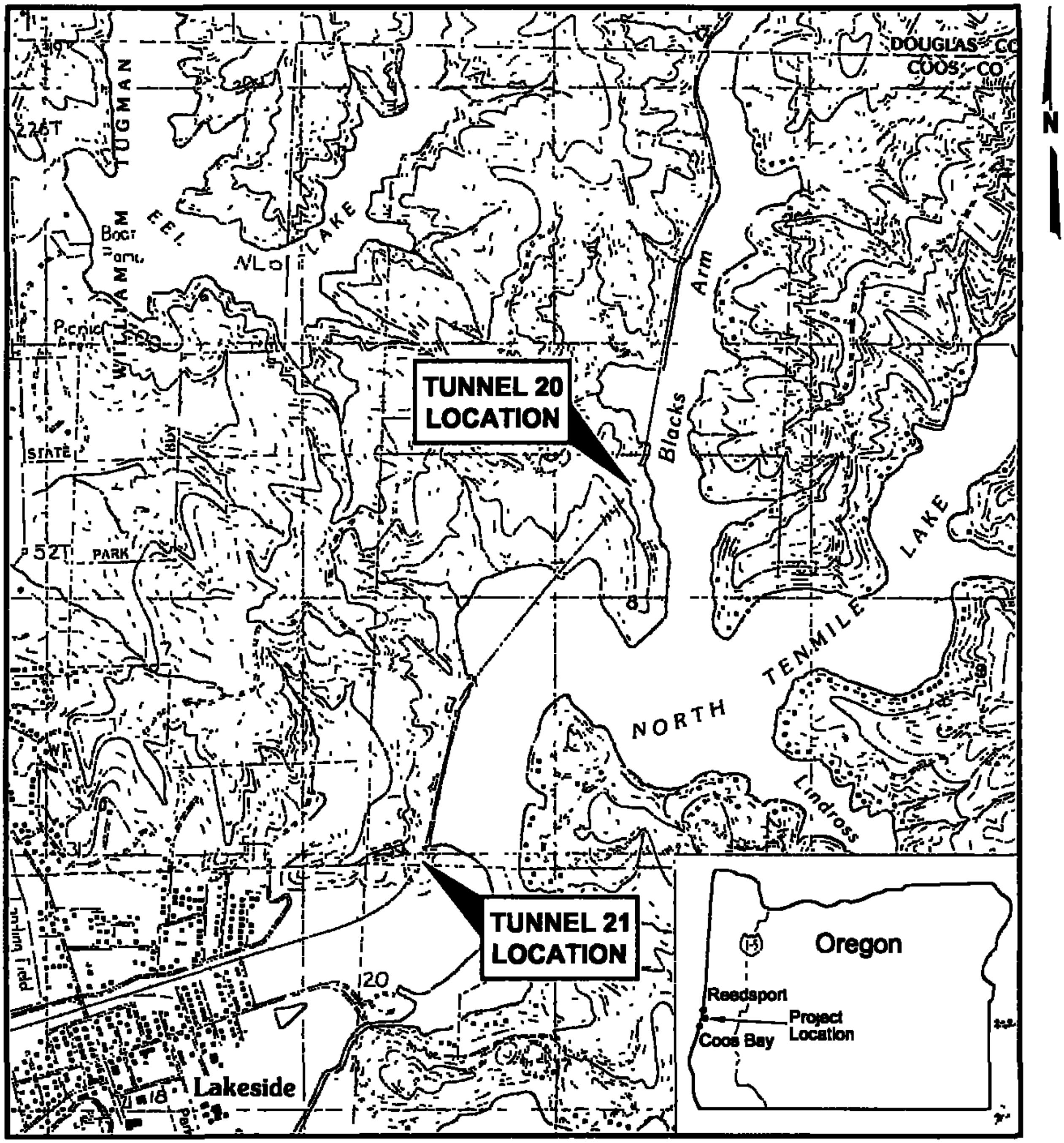
FIG. 7

Filename J:\241\03505-002\24-1-03505-002 Fig 7.dwg Date 09-25-2008 Login BAC



0 1/2 1

Scale in Miles

NOTE

Map adapted from 1:24,000 USGS topographic map of Lakeside, OR quadrangle, Provisional Edition, dated 1985.

ODOT Rail Division
Rail Tunnels Assessments
CORP Coos Bay Division Review

VICINITY MAP TUNNELS 20 AND 21

September 2008 | 24-1-03505-002

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FIG. 8

Filename J:\241\03505-002\24-1-03505-002 Fig 8.dwg Date 09-25-2008 Login BAC